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3924 MEADE ST.
DENVER, COLORADO

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PRODUCTION CHANGES
BULLETIN 92

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 4 IN SET 181

ARVIN MODELS 6173TM, 6175TM-A (Ch. TE331-5), 8171TM (Ch. TE331-6), 8179TM (Ch. TE331-5)

Production changes in Arvin Ch. TE331 through TE331-4 are covered in Production Change Bulletin 66, Set 203-1. Refer to this bulletin for changes made in earlier production.

MODELS 6175 TM-A (Ch. TE331-5), 8171TM (Ch. TE331-6) and 8179TM (Ch. TE331-5) have now been added to this group. A list of the changes made for Ch. TE331-5 and TE331-6 is given below.

Ch. TE331-5

Ch. TE331-5 is identical to Ch. TE331-4 except the picture tube was changed from a 17LP4 to a 17QP4 tube. When the electromagnetic focus tube is used the centering magnet (M6) is deleted and a PM focus magnet (part #C40991-1) is added. The ion trap (M7), also, was changed to part number C25662-3.

Ch. TE331-6

Ch. TE331-6 is identical to Ch. TE331-5, except for a mechanical change in the control mounting.

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 2 IN SET 212

AIRLINE MODELS 35WG-3060B, 35WG-3070B

Airline Models 35WG-3060B and 35WG-3070B are identical to models 25WG-3060A and 25WG-3070A, covered in Photofact Folder 2, Set 212, except for the following:

COMPONENT CHANGES

R73 was changed from 1.2Meg to 1.8Meg.

C78 was changed from 220MMF to 200MMF.

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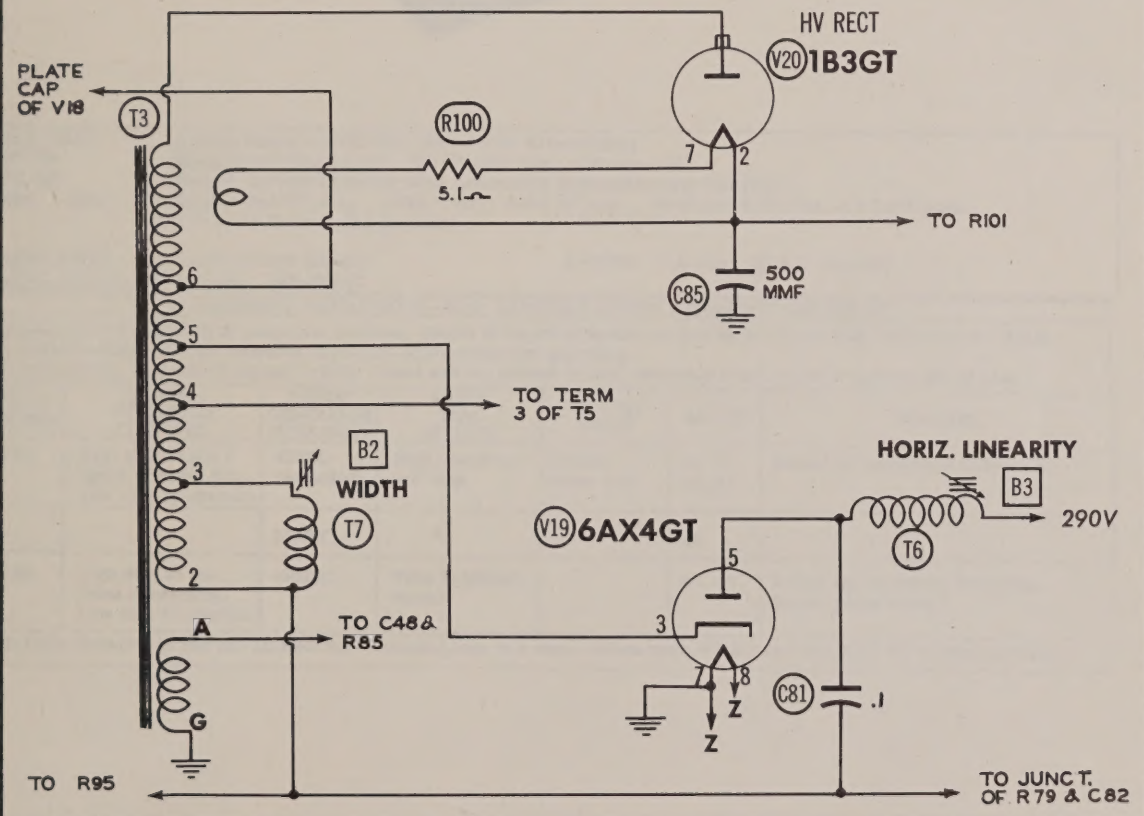
DAMPER TUBE CHANGED

The damper tube (V19) was changed from a type 6W4GT to a type 6AX4GT. A partial schemtic of the new circuit is given below.



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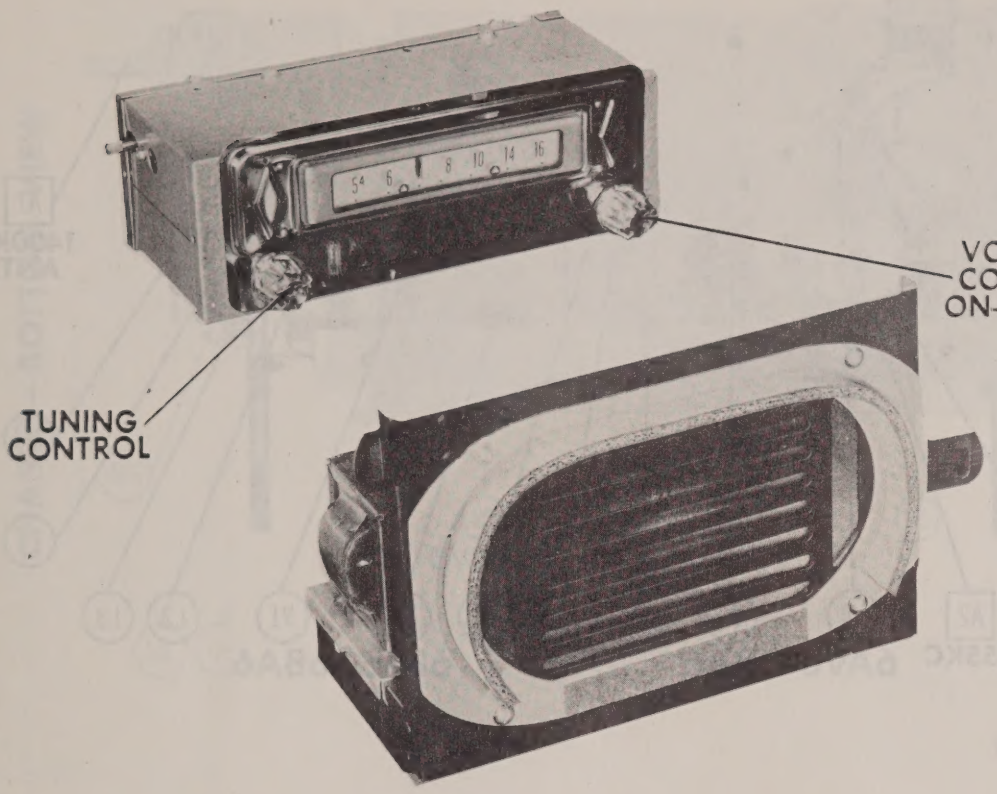

AIRLINE
MODEL 61-6792

TRADE NAME	Airline Model 61-6792 (For 1953 Dodge Automobiles)
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Ill.
TYPE SET	Battery Operated Custom Built Automobile Superheterodyne Receiver
TUBES (Six)	Types 6BA6 RF Amp., 6BE6 Conv., 6BA6 IF Amp., 6AV6 (or) 6AT6 Det.-AVC-AF Amp., 6V6 Audio Output, 6X4 Rectifier
POWER SUPPLY	6 Volt Storage Battery — RATING 5.6 Amp. @ 6.3 Volts DC
TUNING RANGE—BROADCAST	538-1610KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	455KC (400%Mod)	High frequency end stop	Across voice coil	A1, A2, A3, A4	Adjust for maximum deflection.
2.	"	"	1610KC	"	"	A5	"
3.	68MMF	High side to antenna receptacle. Low side to chassis.	1400KC	Tune to 1400KC signal	"	A6, A7	Adjust for maximum deflection. Repeat steps 2 and 3.
4.	With radio installed in car and antenna fully extended, tune to a weak station near 1400KC and adjust A7 for maximum volume.						

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIR LINE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RTMA BASE TYPE	NOTES
V1	RF Amplifier	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amplifier	6BA6	6BA6	7BK	
V4A	Det-AVC-AF Amp.	6AV6	6AV6	7BT	
B	Det-AVC-AF Amp.	6AT6	6AT6	7BT	
V5	Audio Output	6V6	6V6	7S	
V6	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIR LINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	■20	350	CE-86	AFH3-107		CO80		FP345.8	TVL-3632	
B	▲20	350								
C	20	25								
C2	.05	200	C503-2	P288-05	DF-503	PTE4S5		PT415	2TM-S5	
C3	100		CC101	S1100	D6-101	5W5T1	GP2K-101	MC235	5GA-Q1	
C4	.006	400	C602-4	P485-006	D6-602	PTE4D6	GP2-333-602	PT426	4TM-D6	
C5	.05	200	C503-2	P288-05	DF-503	PTE4S5		PT415	2TM-S5	
C6	5		CC50	SI50	D6-050		GP1K-050	NT-555	5GA-V5	
C7	40		CC400	SI40	D6-400		GP1K-400	UC-5439	5GA-Q39	
C8A	220									
B	5000									
C	5000		*PC-151	*PA-113-2	*PC-151		*1408-02		*103C5	
D	250									
F										
C9	.5	100	C504-1	VHC-36		MP-2P5		RF-480	HC-3	
C10	.5	100	C504-1	VHC-36		MP-2P5		RF-480	HC-3	
C11	.005	200	C502-2	P288-005	D6-502	PJ2D5	GP2-333-502	PT425	2TM-D5	
C12	.01	400	C103-6	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C13	.008	1600	C802-16	P1688-008		PTE16D8		PT1628	MB-D8	

* Items C8A, C8B, C8C, C8D, C8E, R9A, R9B and R9C are combined in one unit. When replacing items separately items C8D and C8E should total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIR LINE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	750KΩ	½	RV-W100	Q13-137	AG-79-Z	B-70-S	U-51	Volume-See Note
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	Not Req.	US-26	Attach to R1A

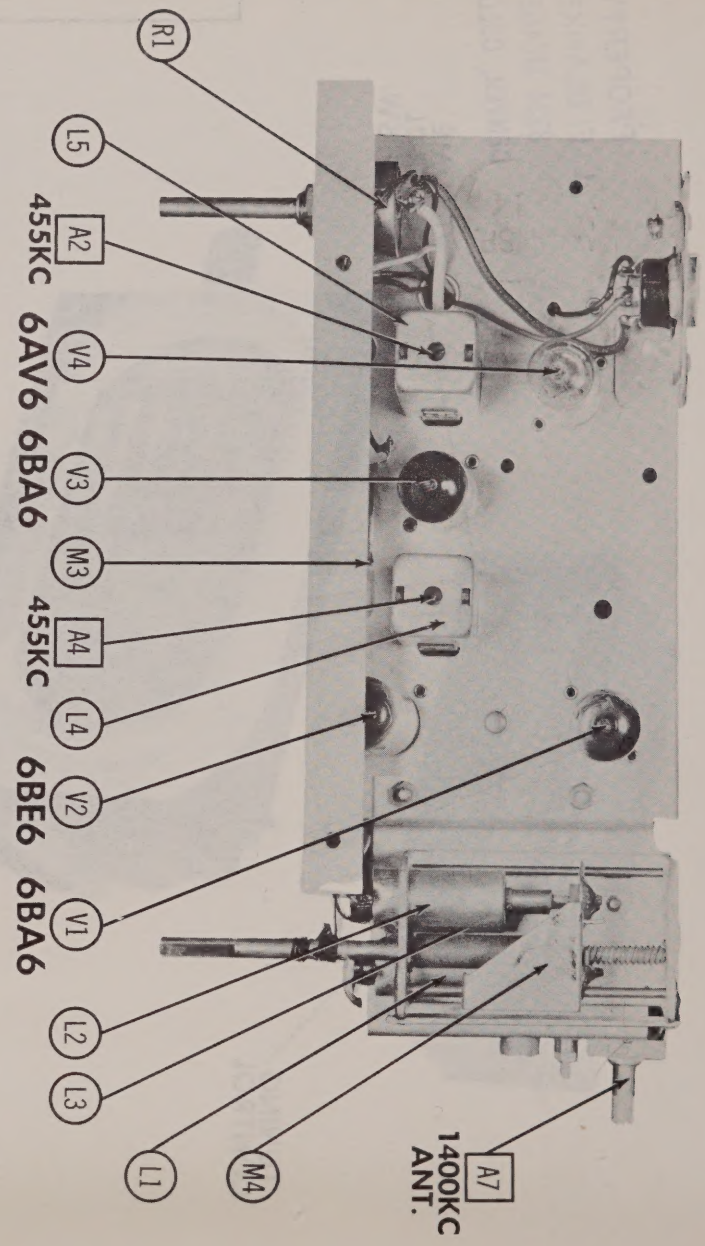
RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AIR LINE PART No.	IRC PART No.	NOTES
R2	470KΩ	½	R474	BTS-470K	
R3	150Ω	½		BTS-150	Note 1
R4	150KΩ	½	R154	BTS-150K	
R5	47KΩ	½	R473	BTS-47K	
R6	1500Ω	½		BTS-1500	Note 2
R7	6800Ω	2	R682-2	BTB-6800	
R8	2. 2Meg	½		BTS-2. 2Meg	Note 3

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AIR LINE PART No.	IRC PART No.	NOTES
R9A	6. 8Meg	½		BTS-6. 8Meg	
B	470KΩ	½	* PC151	BTS-470K	
C	470KΩ	½		BTS-470K	
R10	470KΩ	½	R474	BTS-470K	
R11	330Ω	½	R331	BTS-330	
R12	1000Ω	½	R102-1	BTS-1000	
R13	100Ω	½	R101	BTS-100	
R14	100Ω	½	R101	BTS-100	

* Items R9A, R9B, R9C, C8A, C8B, C8C, C8D, C8E, are combined in one unit.
Note 1. Some models may use a 220Ω resistor in this application.
Note 2. Some models may use a 1000Ω resistor in this application.
Note 3. Some models may use a 2 Meg resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	AIRLINE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	6.3VCT @2.6A	400VCT .052A			TV-100		P-2971	V-16K		T-22R29①

① Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AIRLINE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	5.2KΩ	3.7Ω	Part of Spkr.	A-3877	A-2930	S-3X	Z1001	TS-24S51	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	AIRLINE PART No.	JENSEN PART No.	QUAM PART No.	
SP1	6 x 9"	PM	3.7Ω	PM-900	ST-810 Mod. P68-V	69A3	

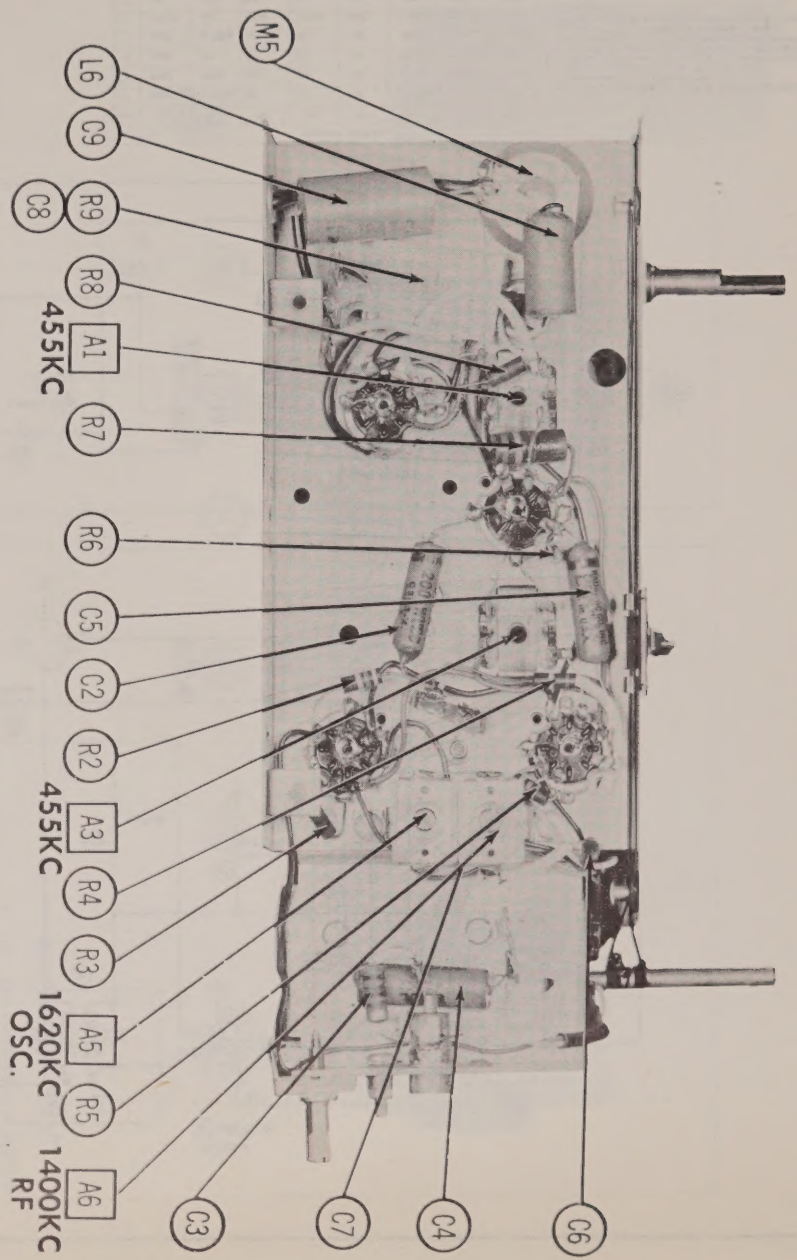
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	12Ω						Part of tuner, tuner part #PT-500
L2	RF Coil	12Ω						Part of tuner
L3	Osc. Coil	.5Ω	2.5Ω					Part of tuner
L4	Input IF	18Ω	18Ω	1655-16	16-6758	BC-352	12-C1	
L5	Output IF	18Ω	18Ω	1655-16	16-6758	BC-353	12-C2	
L6	Fil. Choke	0Ω		L203			5221	1.5 Microhenries
L7	Vibrator Hash Choke	0Ω		L202			5221	21 Microhenries

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				AIRLINE PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	6.3V	115∿	V-83	5301	859	5301	

CHASSIS—BOTTOM VIEW



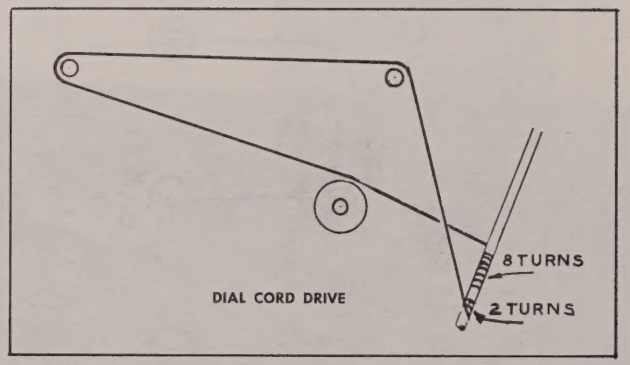
PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

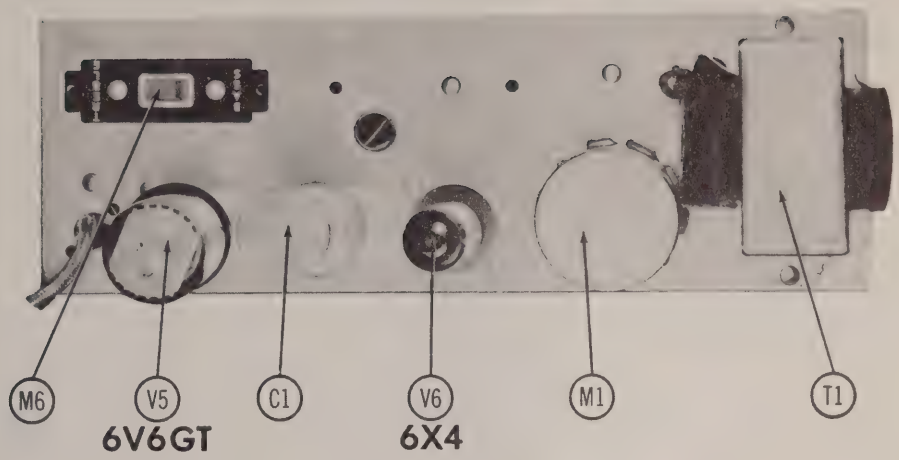
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			AIRLINE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	14A	A200	FH226	307014 (SFE-14A)	155014	SFE14	HD1

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M3	Dial light	T47	#47 bayonet
M4	Tuner	PT-500	Permeability Tuned
M5	Spark Plate		
M6	Switch	SS-1	Tone (SPST slide)
A7	Trimmer cap	CT-1	Antenna compensator
A6	Trimmer cap	CT-2	RF trimmer
A5	Trimmer cap	CT-3	Osc. trimmer
	Knob	H310E	(2) off-on volume & tuning



DIAL CORD DRIVE



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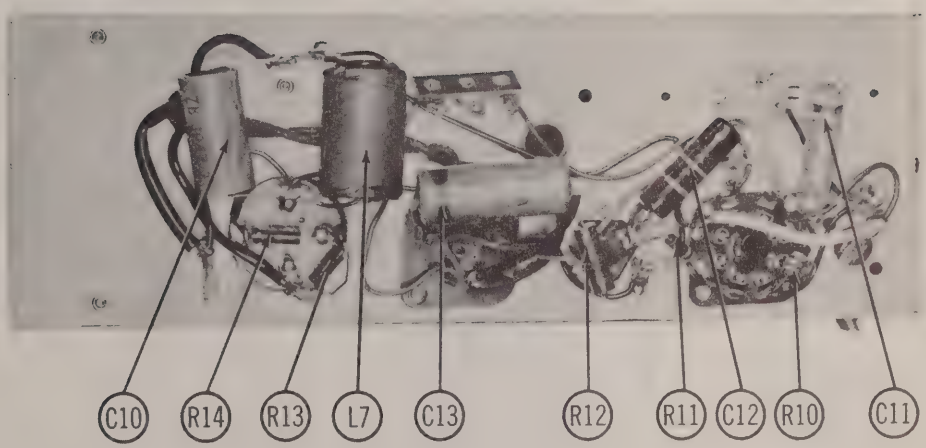

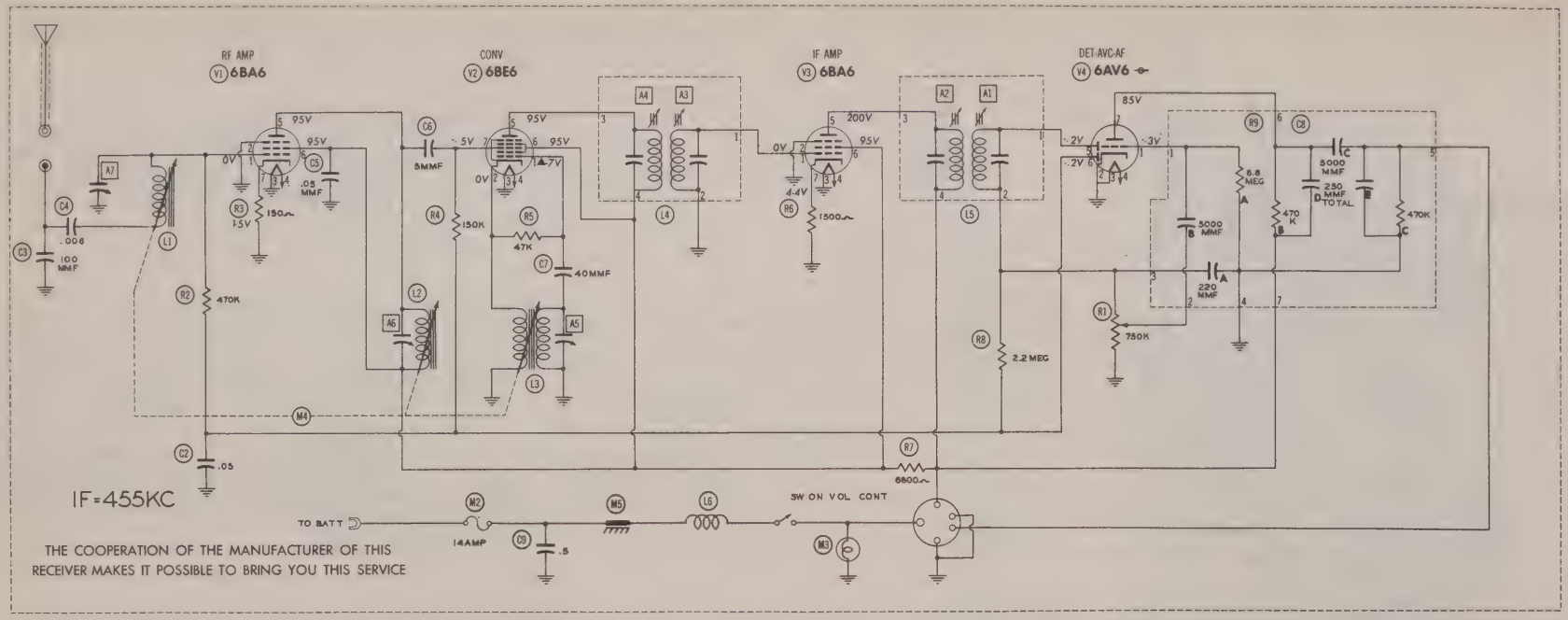

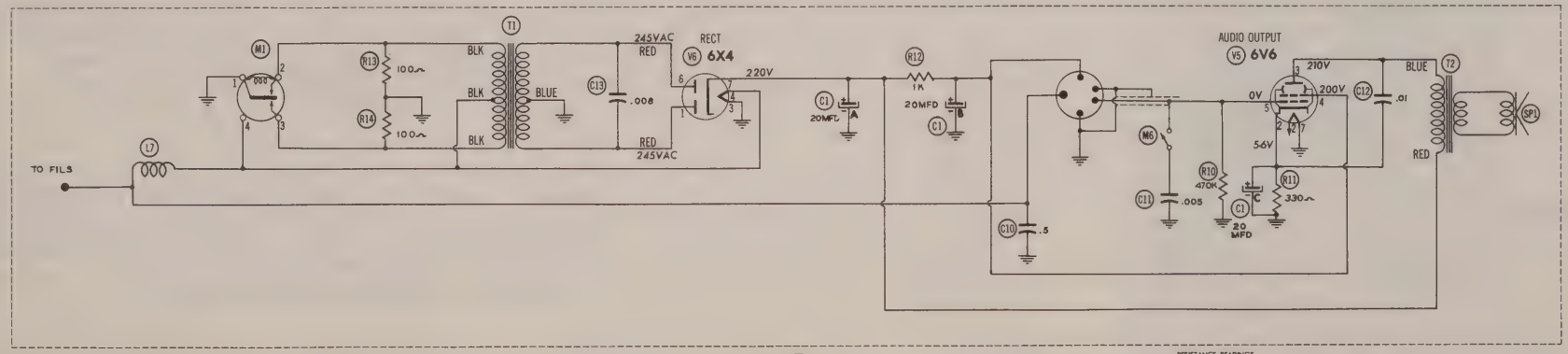

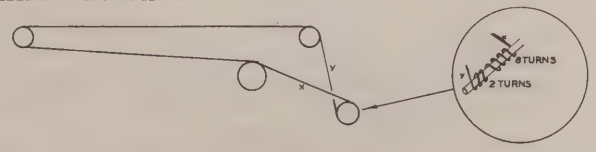

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6BA6	3.4Meg	0Ω	0Ω	.7Ω	††7.8KΩ	††7.8KΩ	150Ω
V 2	6BE6	47KΩ	.5Ω	0Ω	.7Ω	††7.8KΩ	††7.8KΩ	3.1Meg
V 3	6BA6	18Ω	0Ω	0Ω	.7Ω	††1KΩ	††7.8KΩ	1.8KΩ
V 4	6AV6	6.8Meg	0Ω	0Ω	.7Ω	750KΩ	3Meg	††470KΩ
V 5	6V6GT	INF	330Ω	††335Ω	††1KΩ	470KΩ	INF	100KΩ
V 6	6X4	360Ω	INF	5Ω	.7Ω	INF	340Ω	40KΩ

▲ TAKEN WITH VACUUM TUBE VOLTMETER
† MEASURED FROM PIN 7 OF V6

1 - DC Voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Emitter voltage maintained at 6.3 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of a 15% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.

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237-2

PHOTOFACT* Folder

CORONADO MODELS 35TV2-43-9050A, 35TV2-43-9061A, 45TV2-43-9061B, 45TV2-43-9064A

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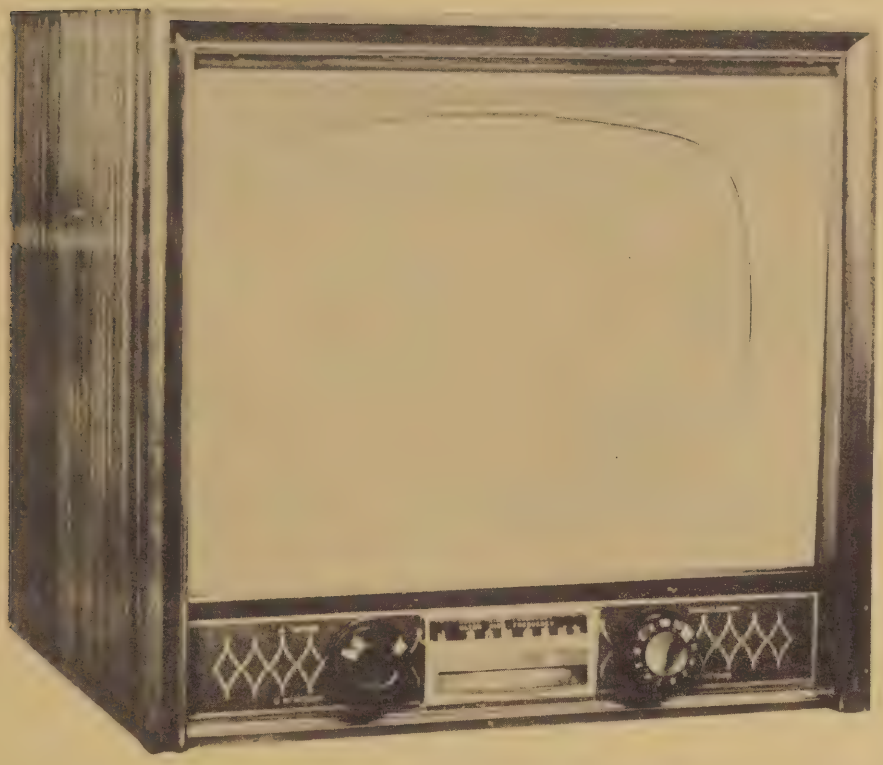

MODEL 35TV2-43-9050A

CORONADO MODELS 35TV2-43-9050A, 35TV2-43-9061A, 45TV2-43-9061B, 45TV2-43-9064A

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PHOTOFACT* Folder

CORONADO MODELS 35TV2-43-9050A, 35TV2-43-9061A, 45TV2-43-9061B, 45TV2-43-9064A

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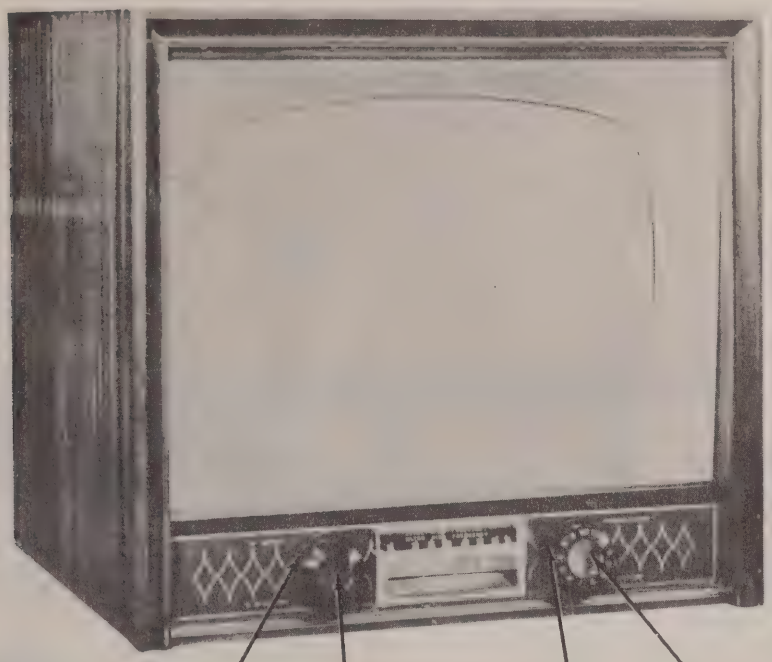

CORONADO MODELS 35TV2-43-9050A, 35TV2-43-9061A, 45TV2-43-9061B, 45TV2-43-9064A

CORONADO MODEL 35TV2-43-9050A

TRADE NAME	Coronado Models 35TV2-43-9050A, 35TV2-43-9061A, 45TV2-43-9061B, 45TV2-43-9064A
SUPPLIER	Gamble-Skogmo Inc., 15 N. 8th St. Minneapolis, Minn.
TYPE SET	Television Receiver
TUBES	Twenty-five

POWER SUPPLY 110-120 Volts AC-60 Cycle RATING 2 Amp. @ 117 Volts AC
TUNING RANGE-Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 26.2 MC, Sound IF 21.7 MC (Intercarrier)

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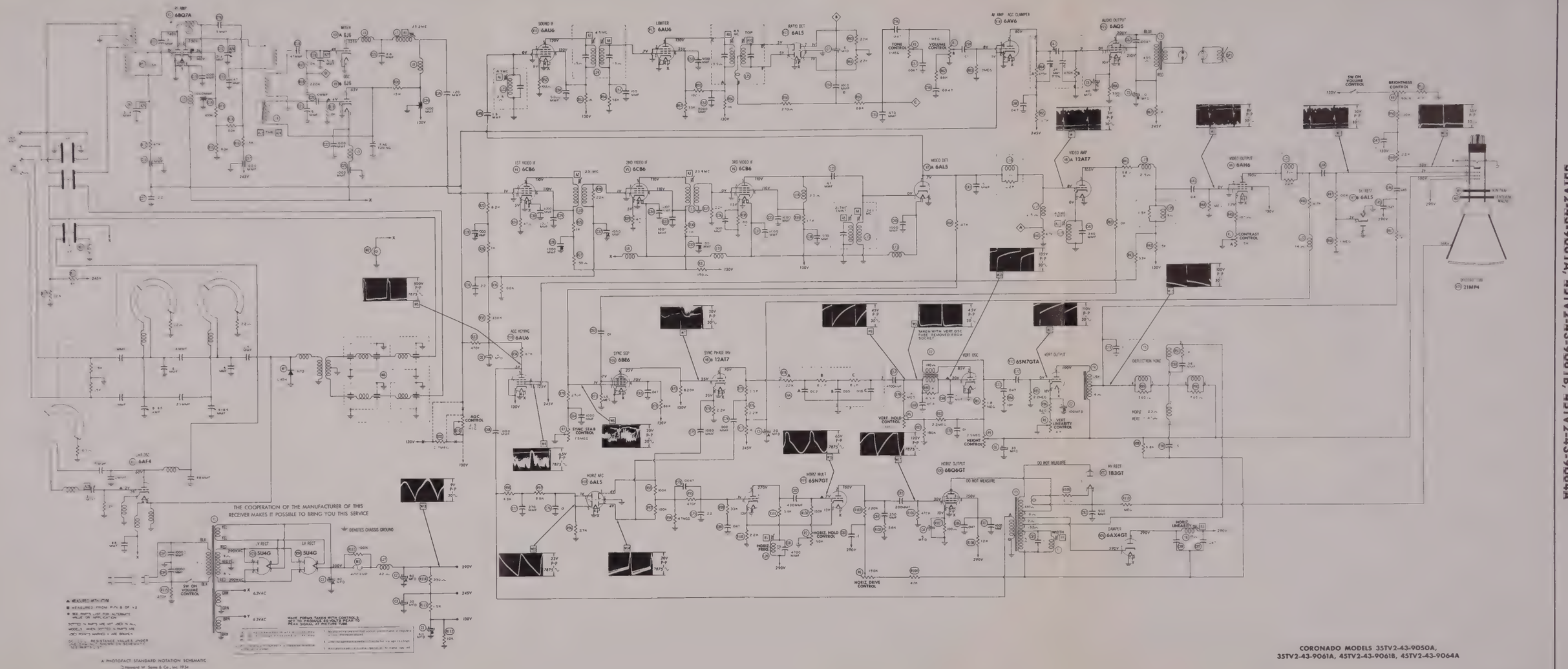
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
DENOTES CHASSIS GROUND
A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1954
CORONADO MODELS 35TV2-43-9050A, 35TV2-43-9061A, 45TV2-43-9061B, 45TV2-43-9064A

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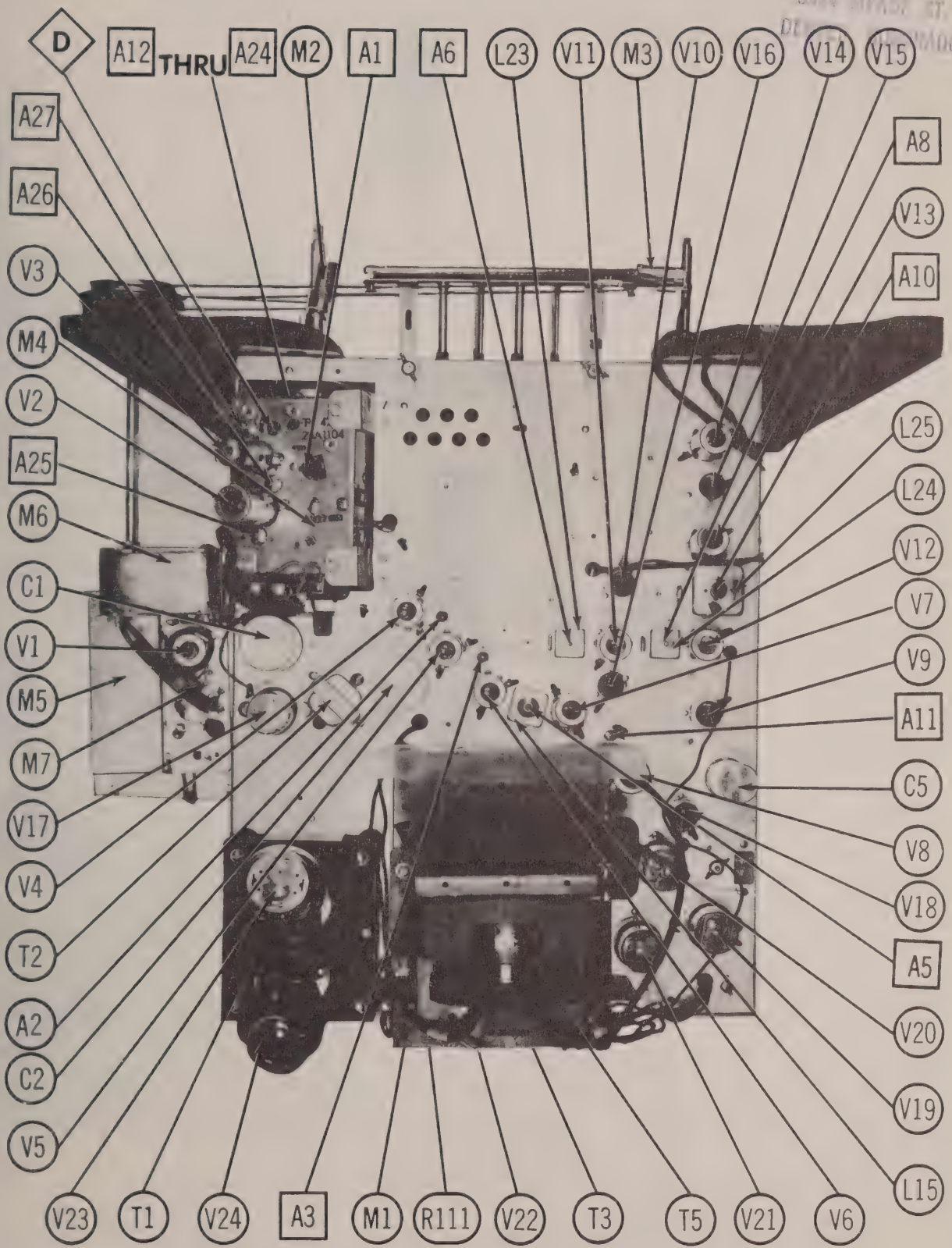

CHASSIS TOP VIEW

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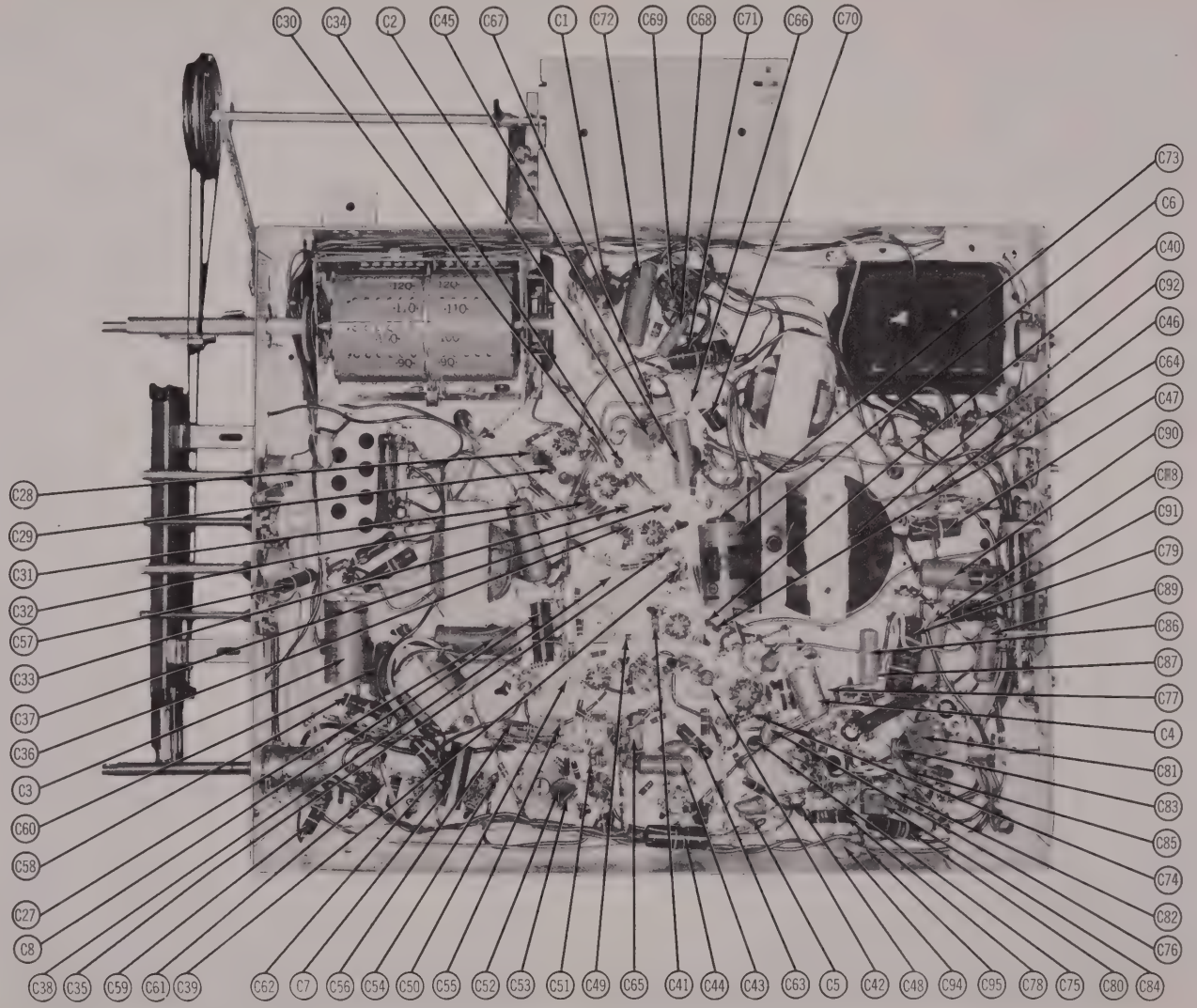
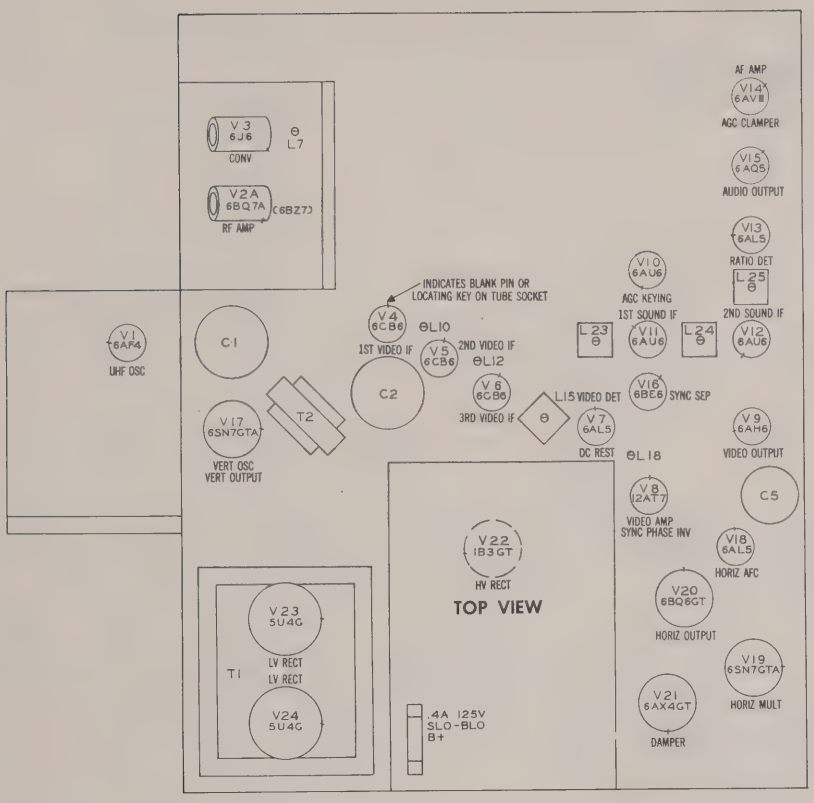


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V23, V24, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7 (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V8, V9, V25
Has pic, no sound - V11, V12, V13, V14, V15
Overloaded picture - V10, V14

SYNC FAILURE
No vert. sync - V8, V17
No horiz. sync - V8, V18, V19
No vert. or horiz. sync - V8, V16

SWEEP FAILURE
No raster, has sound - V19, V20, V21, V22, V25
No vertical deflection - V17
Poor vert. linearity or foldover - V17
Poor horiz. linearity or foldover - V19, V20, V21
Narrow picture - V19, V20, V21, V22, V23, V24
Vert. off freq. - V8, V17
Horiz. off freq. - V8, V18, V19

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the horizontal oscillator tube, V19.

VIDEO IF ALIGNMENT

Remove the converter tube, V2, and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect the negative lead of a 4.5Volt bias supply to the ungrounded side of C31. Connect the positive lead to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	25.2MC (Unmod.)	Any	DC probe thru decoupling filter (Fig.1) to point A . Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	23.1MC	"	"	A2	"
3.	"	"	25.9MC	"	"	A3	"
4.	"	"	24.1MC	"	"	A4	"
5.	"	"	21.7MC	"	"	A5	Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.7MC 23.0MC 23.5MC 25.25MC 26.2MC	Any	Vert. Amp. thru decoupling filter (Fig. 1) to point A . Low side to chassis.		Check for response curve similar to Fig.3. If necessary retouch A1 thru A4 for desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.01MFD	High side to pin 1 (cathode) of 6AL5 (V7A). Low side to chassis.	4.5MC (Unmod.)	Any	DC probe to point B . Common to chassis.	A6, A7, A8, A9	Adjust for maximum deflection.
8.	"	"	"	"	DC probe to point C . Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.01MFD	High side to pin 1 (cathode) of 6AL5 (V7A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru decoupler (Fig.1) to point B . Low side to chassis.	A6, A7, A8, A9	Disconnect stabilizer capacitor C7. Adjust for curve of maximum amplitide and symmetry as in Fig. 3.
8.	"	"	"	"	"	Vert. Amp. thru decoupler (Fig.1) to point C . Low side to chassis.	A10	Reconnect stabilizer capacitor C7. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Turn contrast control to maximum clockwise position.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Direct	High side to pin 7 of 6AL5 (V7A). Low side to chassis.	Not used	4.5MC (400%Mod)	Any	Vert. amp. thru decoupler (Fig.1) to pin 2 of picture tube. Low side to chassis.	A 11	Adjust for minimum 400% indication on scope

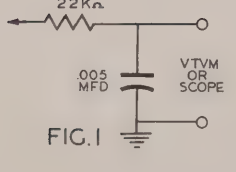


FIG.1

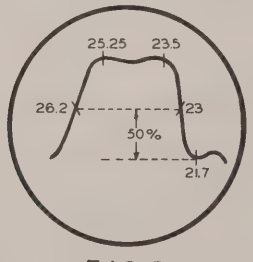


FIG.2

FIG. 3

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3924 MEADE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket.
The oscillator adjustment screws for each channel are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru decoupler (Fig.1) to point A . Low side to chassis.	A12	Adjust to place sound marker in notch as in Fig. 5. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A13	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A14	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A15	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A16	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A17	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A18	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A19	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A20	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A21	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A22	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A23	
11.	"	Across output of UHF tuner	124MC (10MC Swp)	121.75MC 126.25MC	UHF		A24	

RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru decoupler (Fig.1) to point D . Low side to chassis.	A25, A26 A27	Adjust for response curve similar to Fig.6. with markers above 90%.
13.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig.6. If markers fall below 70% on any channel make slight compromise adjustment of A24, A25, and A26 with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.75MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			
			124MC (10MC Swp)	121.75MC 126.25MC	UHF			

UHF TUNER ALIGNMENT

Due to circuit complexity of the UHF tuner, alignment in the field should not be attempted.
Service should also be limited to the replacement of oscillator tube (V3) and crystal 1N72/1N82.
If either crystal or oscillator is replaced adjustment of the UHF oscillator trimmer, A28, maybe necessary. If necessary, adjust A28 for tuner range of below 470MC to above 890MC.
If the UHF tuner does not operate properly after tube or crystal replacement and adjustment of A28 the tuner should be returned to the factory.

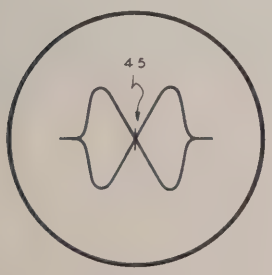


FIG. 4

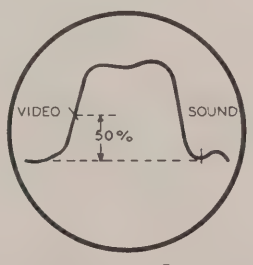


FIG.5

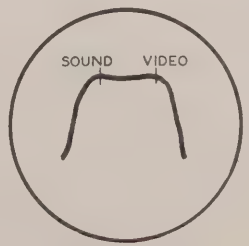
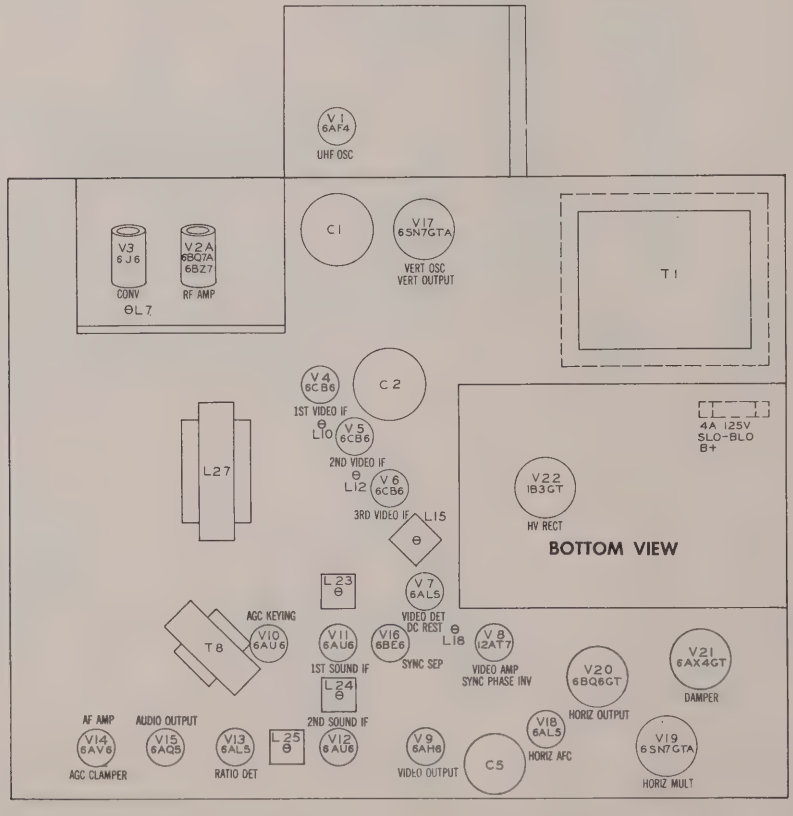


FIG.6

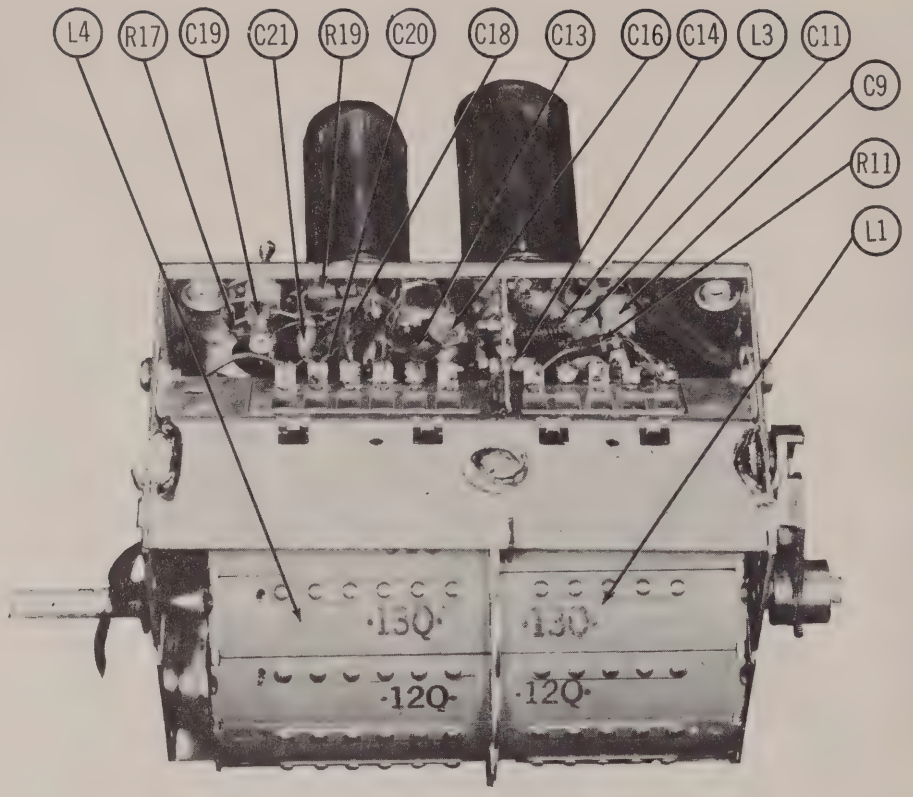
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	■6KΩ	12KΩ	.1Ω	.2Ω	.1Ω	12KΩ	■6KΩ		
V 2	6BQ7A	INF	680KΩ	0Ω	.1Ω	0Ω	■2KΩ	160KΩ	INF	0Ω
V 3	6J6	17KΩ	■2KΩ	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 4	6CB6	110KΩ	47Ω	.1Ω	0Ω	■2.8KΩ	■2.8KΩ	0Ω		
V 5	6CB6	100KΩ	47Ω	.1Ω	0Ω	■2.8KΩ	■2.8KΩ	0Ω		
V 6	6CB6	.3Ω	180Ω	.1Ω	0Ω	■3KΩ	■3KΩ	0Ω		
V 7	6AL5	.7Ω	0Ω	.1Ω	0Ω	1Meg	0Ω	4.7KΩ		
V 8	12AT7	■8.5KΩ	4.7KΩ	.2Ω	0Ω	0Ω	■7.5KΩ	■820KΩ	2.2KΩ	.1Ω
V 9	6AH6	1Meg	0Ω	.1Ω	0Ω	■6.2KΩ	■1.8KΩ	500Ω		
V 10	6AU6	■36.5K	■1.8KΩ	.1Ω	0Ω	470KΩ	■400Ω	■1.8KΩ		
V 11	6AU6	.1Ω	0Ω	.1Ω	0Ω	■2.6KΩ	■2.6KΩ	100Ω		
V 12	6AU6	56KΩ	0Ω	.1Ω	0Ω	■2.6KΩ	■24KΩ	0Ω		
V 13	6AL5	INF	INF	0Ω	.1Ω	22KΩ	INF	22KΩ		
V 14	6AV6	10Meg	0Ω	.1Ω	0Ω	680KΩ	680KΩ	■520KΩ		
V 15	6AQ5	470KΩ	330Ω	0Ω	.1Ω	■1.7KΩ	■1.3KΩ	470KΩ		
V 16	6BE6	40KΩ	0Ω	.1Ω	0Ω	■820KΩ	■70KΩ	1.5Meg		
V 17	6SN7GT	2Meg	▲1.7Meg	0Ω	2.2Meg	▲7KΩ	2KΩ	.1Ω	0Ω	
V 18	6AL5	4.8Meg	4.8Meg	.1Ω	0Ω	9KΩ	INF	9KΩ		
V 19	6SN7GT	170KΩ	▲340KΩ	2.2KΩ	5Meg	■5.6KΩ	2.2KΩ	.1Ω	0Ω	
V 20	6BQ6GT	5.6KΩ	0Ω	INF	■12KΩ	470KΩ	420KΩ	.1Ω	100Ω	TOP CAP ▲16Ω
V 21	6AX4GT	6.3KΩ	INF	440KΩ	4.5Meg	■50Ω	6.3KΩ	0Ω	.1Ω	
V 22	1B3GT	PINS 1-8 HAVE INF. RESISTANCE								TOP CAP ▲446Ω
V 23	5U4G	INF	10KΩ	INF	18Ω	INF	19.5Ω	INF	10KΩ	
V 24	5U4G	INF	10KΩ	INF	18Ω	INF	19.5Ω	INF	10KΩ	
V 25	21MP4	0Ω	1.1Meg	PIN 6 ■50Ω	PIN 10 ▲6.8KΩ	PIN 11 ■180KΩ	PIN 12 .1Ω			

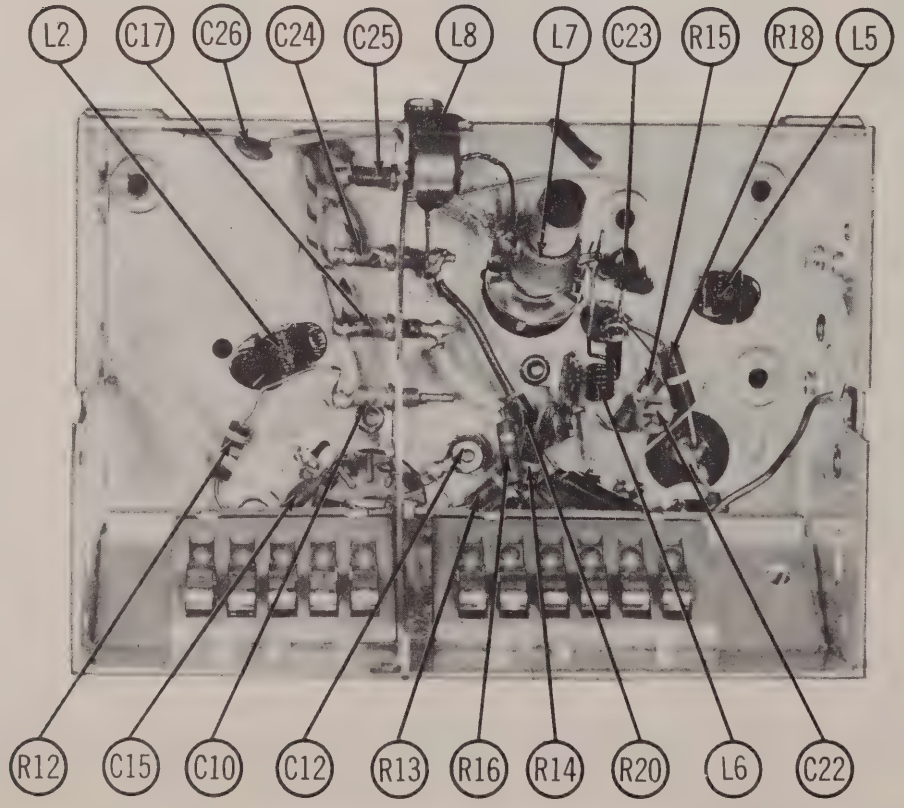
■MEASURED FROM PIN 2 OF V24.
▲MEASURED FROM PIN 3 OF V21.



TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW

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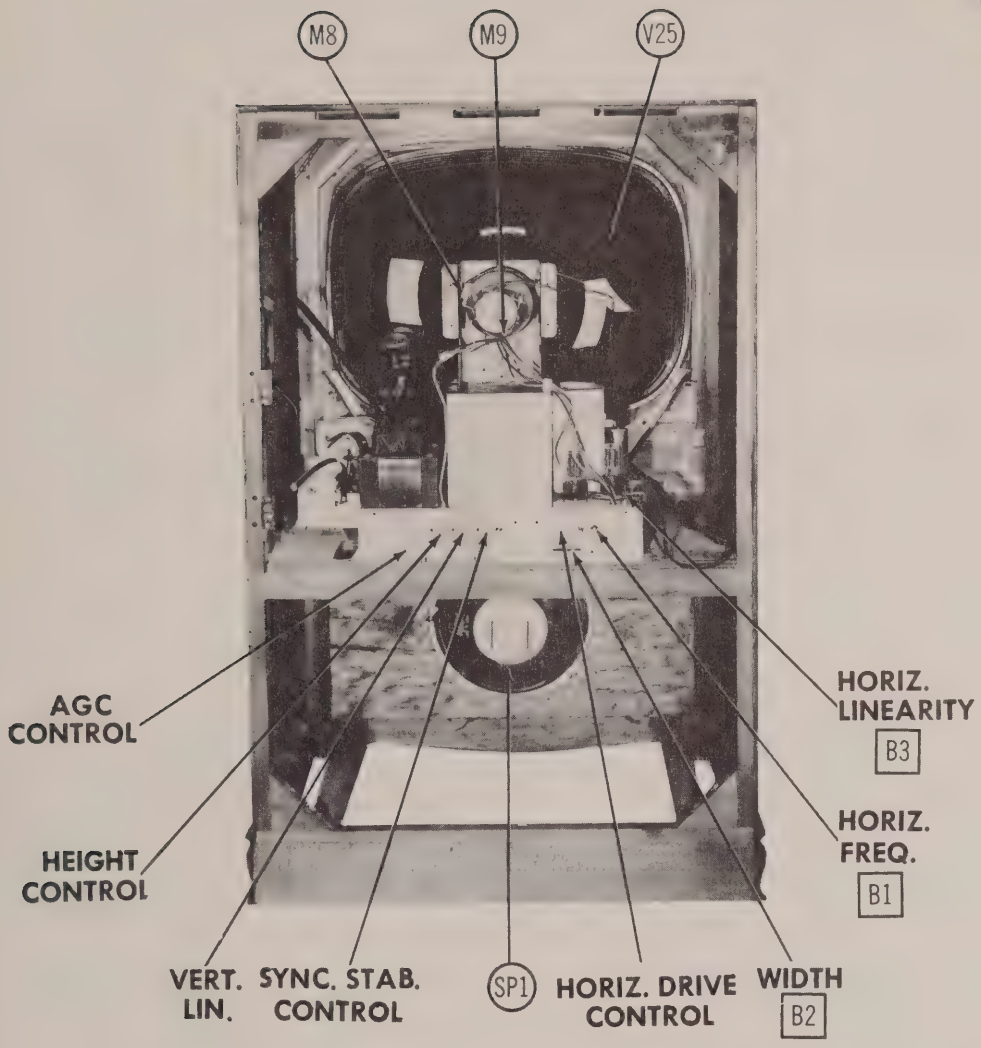


CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until the picture falls into sync.

Adjust the horizontal drive control for the best compromise between brightness and linearity.

Adjust the width slug (B2) for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the horizontal linearity slug (B3) for a picture that is symmetrical from left to right.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V19, V20, V21, V23 and V24. Check adjustment of horiz. drive control, B2 and B3. Check waveform W17.

If Satisfactory	If Unsatisfactory
Check C86, C87, C90, C91, T3, T5A, R108 and other associated components.	Check C82, C83, C84, C85, R103, R104, R106, R101, R100, R6 and other associated components.

DRIVE LINES

Check adjustment of horiz. drive control. Check by substitution V19, V20 and V21. Check C83, C84, C85, C88, C89, T3, T5A and other associated circuit components.

COMPRESSED LEFT SIDE

Check horiz. drive adjustment. Check adjustment of B2 and B3. Check by substitution V19, V20 and V21. Check T3, T5A, C86, C87 and other associated components.

FOLDS

Check by substitution V19, V20 and V21. Check T3, T5A and other associated components.

XMAS TREE EFFECT

Substitute V19. Check C81, C82 and other components associated with V19.

VERTICAL

LOSS OF SWEEP

Substitute V17. Check waveform W11.

If Satisfactory	If Unsatisfactory
Check T4 and T5B.	Check C71, C72, C68, C69, R88, R81 and other associated components.

INSUFFICIENT SWEEP

Substitute V17. Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Substitute V17. Check R81, R9, C70, R85, C72 and other associated circuit components.

COMPRESSED AT TOP

Substitute V17. Check C2B, T4, T5B, R8 and other associated components.

FOLDS

Substitute V17. Check assoicated circuit components.

SYNC

HORIZONTAL

LOSS OF SYNC

Check by substitution V18 and V19. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check components associated with V18 and V19 especially R98, R97, R95 R99, C76, C77, C79 and C80.	Check C74, C75, R92 and R93.

CRITICAL HOLD

Check by substitution V18 and V19. Check adjustment of B1. Follow procedure outlined under "Loss of Sync".

HORIZONTAL BENDING OR S-ING

Check by substitution V19, V20, V16 and V8. Check adjustment of sync stability and AGC threshold controls. Check C1A and C2A.

VERTICAL

LOSS OF SYNC

Check by substitution V16, V8 and V17. Check waveform W9.

If Satisfactory	If Unsatisfactory
Check components associated with V17 especially C68 and T2.	Check vert. integrator network C67, C63 and other components associated with V16 and V8.

CRITICAL HOLD

Substitute V17, V16 and V8. Check adjustment of sync stability and AGC threshold controls. Proceed as outlined under "Loss of Sync".

TRIGGERING

Check by substitution V17, V16 and V8. Check circuit near these stages for filament lead dress.

VIDEO

LOSS OF VIDEO

Check by substitution V7, V8 and V9. Check picture tube and other associated components especially coupling capacitors and plate load resistors.

SOUND BARS (4.5 MC BEAT)

Check alignment of local oscillator. Check adjustment of 4.5 MC trap (A11). Check video IF alignment.

NEGATIVE PIX

Check by substitution V7, V8, V9 and V10. Check setting of the AGC threshold control. Check picture tube and other associated circuit components.

POOR CONTRAST

Check by substitution V1, V4, V5, V6, V7, V8 and V9. Check associated circuit components. Check picture tube.

SMEAR

Check by substitution V7, V8 and V9. Check L16, L20 and L21. Check C41, C43 and C44. Check R41, R42, R44 and R46 for change of value. Check picture tube and other associated components.

WIDE BLACK BAR ACROSS PIX

Check tuner, video IF, video detector and video amplifier tubes for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V11, V12, V13, V14 and V15. Check stages of V14 and V15 using audio signed generator. Apply signal across R63.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V14 and V15 especially C61.

BUZZ

Realign audio IF and ratio detector following procedure outlined in the alignment section. If buzz is still objectionable substitute V13 and readjust A9 and A10. Check C54 and C7.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		CORONADO PART No.	STANDARD REPLACEMENT		
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2A	RF Amplifier	6BQ7A	6BQ7A	9AJ	
B	RF Amplifier	6BZ7	6BZ7	9AJ	
V3	Converter	6J6	6J6	7BF	
V4	1st. Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Detector-DC Restorer	6AL5	6AL5	6BT	
V8	Video Amplifier Sync Phase Inv.	12AT7	12AT7	9A	
V9	Video Output	6AH6	6AH6	7BK	
V10	AGC Keying	6AU6	6AU6	7BK	
V11	1st. Sound IF Amp.	6AU6	6AU6	7BK	
V12	Limiter	6AU6	6AU6	7BK	
V13	Ratio Detector	6AL5	6AL5	6BT	
V14	AF Amplifier-AGC Clamper	6AV6	6AV6	7BT	
V15	Audio Output	6AQ5	6AQ5	7BZ	
V16	Sync Separator	6BE6	6BE6	7CH	
V17	Vert. Oscillator - Vert. Output	6SN7GTA	6SN7GTA	8BD	
V18	Horiz. AFC	6AL5	6AL5	6BT	
V19	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V20	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V21	Damper	6AX4GT	6AX4GT	4CG	
V22	HV Rectifier	1B3GT	1B3GT	3C	
V23	LV Rectifier	5U4G	5U4G	5T	
V24	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA				RETMA BASE TYPE	NOTES
	CORONADO PART No.	SYLVANIA PART No.	GENERAL ELECTRIC PART No.	WESTINGHOUSE PART No.		
V25	21MP4	21MP4	21MP4	21MP4	12C	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	CORONADO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲80	400	45X390	AFH3-46		CO37		FP378	R1341	
B	▲60	400								
C2A	▲80	400	45X391	AFH3-142		C109		FP375	TVL-3764	
B	▲100	50								
C3	30	400	45X393	PRS450/30		BR3045A		TC77	TVA-1711	
C4	5	25	45X378	PRS150/4		BR550		TC30	TVA-1203	
C5A	■20	400	45X392	AFH3-137		CO97		FP366	TVL-3751	
B	▲10	400								
C	40	50								
C6	30	400	45X393	PRS450/30		BR3045A		TC77	TVA-1711	
C7	5	25	45X378	PRS150/4		BR550		TC30	TVA-1203	
C8	4	100	45X361	PRS150/4		BR415		TC40	TVA-1402	
C9	3-9		31B-207		829-10					
C10	1000		13D-153	EF-001	MFT-1000				503C-D1	
C11	3		CD8C3R6C	SI3NP0						
C12	.5-3		31B-206		829-3			CT565A		
C13	47		CD8Q470K	BPD-000047	D6-470		GP1K-470	UC-5447	5GA- Q47	
C14	1000		13D-196	EF-001	MFT-1000				503C-D1	
C15	1000		CD8X102Z	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C16	1.5		CD8C1R5M	SI1.5NP0	TCZ-1.5		NP0K-1R5	ZT-5515	5TCCB-V15	
C17	1000		13D-153	EF-001	MFT-1000				503C-D1	
C18	47		CD8Q470K	BPD-000047	D6-470		GP1K-470	UC-5447	5GA-Q47	
C19	.5-3		31B-206		829-3			CT565A		
C20	10		CD10C100K	SI10NP0	TCZ-10		NP0K-100	ZT-541	5TCC-Q1	
C21	5		CD8U050C	SI5N750	TCN-5		N750K-050		5TCUB-V5	
C22	1000		CD8X102Z	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C23	6.8		CD8C6R8C	SI6.8NP0	TCZ-6.8		NP0K-6R8	ZT-5568	5TCCB-V68	
C24	1000		13D-153	EF-001	MFT-1000				503C-D1	
C25	1000		13D-153	EF-001	MFT-1000				503C-D1	
C26	120		13D-055	BPD-00012	D6-121	TM5T12	GP2K-121	UC-5312	5GA-T12	
C27	.22	200	RCP10M2224M	P488-22		PTE4P22		PT4025	2TM-P22	
C28A	1000		80X3	BPD-2X001	DD2-102	TM5DD1	812-001	DCD-521	5HK-2D1	
B	1000									
C29	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C30	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C31	.22	200	RC10M2224M	P488-22		PTE4P22		PT 4025	2TM-P22	
C32A	1000		80X3	BPD-2X001	DD2-102	TM5DD1	812-001	DCD-521	5HK-2D1	
B	1000									
C33	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C34	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C35	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C36	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C37	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C38	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C39	47		47X603	SI47	D6-470		GP1K-470	UC-5447	5GA-Q47	
C40	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C41	5		47X562	SI5NP0	TCZ-4.7		NP0K-050	ZT-555	5TCCB-V47	
C42	360	500	47X568							
C43	.047	400	RCP10M4473M	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C44	.1	400	RCP10M4104M	P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C45	.047	600	RCP10M6473M	P688-047	DF-503	PTE6S47		PT6147	6TM-S47	
C46	.015	600	RCP10M6153M	P688-015		PTE6S15		PT6115	6TM-S15	
C47	.1	200	RCP10M2104M	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C48	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA: CORONADO PART No	AEROVOX PART No	CENTRALAB PART No	CORNELL DUBILIER PART No	ERIE PART No	MALLORY PART No.	SPRAGUE PART No.	NOTES
C49	1.5		47X584	SU-5NP0	TCZ-1.5		NPOR-1R5	2T-5515	5TCCB-V15	
C50	5000		47X507	BPD-005	MD-502	TM5D5	8U-005	DC-525	5HK-D5	
C51	100		47X604	SU100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C52	5000		47X507	BPD-005	MD-502	TM5D5	8U-005	DC-525	5HK-D5	
C53	5000		47X507	BPD-005	MD-502	TM5D5	8U-005	DC-525	5HK-D5	
C54	1000		80X1	BPD-001	DD-102	TM5D1	80U-001	DC-531	5HK-D1	Note 1
C55	470	500	47X525	1469-00005		5R5T5		MCB245	M3-35	
C56	.047	600	RCP10M2473M	P688-047	DF-503	PTE6D47	GP2-333-472	PT6247	67M-D47	
C57	.0047	400	RCP10M4473M	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	67M-D47	
C58	.0047	400	RCP10M4473M	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	67M-D47	
C59	.01	400	RCP10M4103M	P688-01	D6-103	PTE6S1	GP2-333-103	PT6141	47M-S1	
C60	.047	400	RCP10M4473M	P688-047	DF-503	PTE4S47		PT4147	47M-S47	
C61A	.01									
B			†76X5	†PA-112-3	†PC-80		†1404-01		†103C1	
C	350									
C62	.0047	600	RCP10M6472M	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	67M-D47	
C63	.01	400	RCP10M4103M	P688-01	D6-103	PTE6S1	GP2-333-103	PT6141	47M-S1	
C64	1000		80X1	BPD-001	DD-102	TM6D1	80U-001	DC-531	5HK-D1	
C65	.047	400	RCP10M4473M	P688-047	DF-503	PTE4S47		PT4147	47M-S47	
C66A	.002					PTE6D5		PT625		
B	.005		*76X7	*PA-110	*PC-100	PTE6D5	*1406-01	PT625	*101C1	
C	.005					PTE6D5		PT625		
C67	4700	500	47X543	1464-005		5R5T2		MCB465	M3-35	
C68	.0047	400	RCP10M4472M	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	67M-D47	
C69	100		47X504	SU100	D6-101	TM6T1	GP1K-101	UC-531	5GA-T1	
C70	.01	600	RCP10M6103M	P688-01	D6-103	PTE6S1	GP2-333-103	PT6141	47M-S1	
C71	.047	600	RCP10M6473M	P688-047		PTE6S47		PT6147	67M-S47	
C72	.1	600	RCP10M6104M	P688-1	DF-104	PTE6P1		PT601	67M-P1	
C73	.1	600	RCP10M6104M	P688-1	DF-104	PTE6P1		PT601	67M-P1	
C74	1000		80X1	BPD-001	DD-102	TM6D1	80U-001	DC-531	5HK-D1	
C75	1000		80X1	BPD-001	DD-102	TM6D1	80U-001	DC-531	5HK-D1	
C76	.01	400	RCP10M4103M	P688-01	D6-103	PTE4S1	GP2-333-103	PT4141	47M-S1	
C77	270	500	RCM20A271K							
C78	.0047	400	RCP10M4472M	P688-0047	D6-472	PTE4D47	GP2-333-472	PT6247	67M-D47	
C79	.22	200	RCP10M2224M	P688-22		PTE4P22		PT4025	27M-P22	
C80	.047	200	RCP10M2473M	P688-047	DF-503	PTE4P47		PT4047	27M-S47	
C81	4700	500	47X543	1464-006		IDR5D5		MCB465	M3-35	
C82	430	500	RCM20B431K							
C83	.1	400	RCP10M4104M	P688-1	DF-104	PTE4P1		PT401	47M-P1	
C84	330	500	47X570	1469-00035						
C85	200	500	RCM20A201K	1469-0002		5R5T2		MCB237	M3-32	
C86	.047	400	RCP10M4473M	P688-047	DF-503	PTE4S47		PT4147	47M-S47	
C87	1000		80X1	BPD-001	DD-102	TM5D1	80U-001	DC-531	5HK-D1	
C88	.1	400	RCP10M4104M	P688-1		PTE4P1		PT401	47M-P1	
C89	.047	400	RCP10M4473M	P688-047		PTE4S47		PT4147	47M-S47	
C90	.15	400	RCP10M4154M	P688-15		PTE4P15		PT4015	47M-P15	
C91	.1	200	RCP10M2104M	P688-1	DF-104	P22P1		PT401	27M-P1	
C92	500	20000	47X560	HV20C	TV3-503	MM-C20T5	413-501	HV20005A	20DE-T5	
C93	56	1500	47X598		DiS-560				20GA-Q56	
C94	10000		47X615	BPD-01	DD-103	TM5S1	81U-01	DC-511	5HK-S1	
C95	10000		47X615	BPD-01	DD-103	TM5S1	81U-01	DC-511	5HK-S1	

Note 1. When using Ratio Det. Transformer part #9A2295, C54 is 330MMF (part #47X570)

† Items C61A, C61B, C61C, R64A, R64B are combined in one unit.
When replacing items separately C61B and C61C should total 250MMF.

♦ Items C66A, C66B, C66C, R78A, R78B, R78C are combined in one unit.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: CORONADO PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No	MALLORY PART No.	INSTALLATION NOTES
R1A	1500Ω	½	78X12B	QJ-418*	RTV-405			Contrast - Panel
B	1Meg	½						Volume & Sw.-tapped ④ 250KΩ - rear
R2A	50KΩ	½	40X361-C	QII-123	AG-44-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	NQ	RS- 3/16	AK-4	DS-37	Attach to R2A
R3A	1Meg	½	40X334-E	QII-127	AG-61-S	AB-59	U-54	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A
R4A	500KΩ	½	40X333-A	QII-133	AG-58-S	AB-59	U-50	Brightness
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R4A
R5A	1Meg	½	40X334-E	QII-127	AG-61-S	AB-59	U-54	Vert. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R5A
R6A	150KΩ	½	40X331-A	QII-129	AG-53-S	AB-46	U-43	Horiz. Drive
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7	1.5Meg	½	40X363-B					Sync Stability
R8A	4000Ω	½	40X368-B	QII-114	AG-80-S	AB-9	SU-14	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A
R9A	2.5Meg	½	40X364	QII- 239	AG-84-S	AB-48	SU-565	Height
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R9A
R10A	2.5Meg	½	40X364	QII- 239	AG-84-S	AB-48	SU-565	AGC
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R10A

* CONCENTRIC EQUIVALENT - KIT K-2, BASE ELEMENTS & SHAFTS B17-109 & P1-310 (Panel)
B13-137X & R2-322 (Rear) & SWITCH 76-2.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: CORONADO PART No	IRC PART No.	NOTES
R11	15KΩ	½	12A-004		
R12	47KΩ	½	12A-039		
R13	100KΩ	½	12A-051	BTS-100K	
R14	100KΩ	½	12A-166	BTS-100K	
R15	150KΩ	½	12A-167		
R16	1500Ω	½	12A-183	BTS-1500Ω	
R17	10KΩ	½	12A-040		
R18	220KΩ	½	12A-041		
R19	10KΩ	½	12A-040	BTS-10KΩ	
R20	15KΩ	½	12A-040		
R21	8000Ω	5	43X279	1.3/4A-8000	
R22	12KΩ	3	D84123	BTS-12K	
R23	8200Ω 5%	½	B83822		
R24	47Ω	½	B83470	BTS-47	
R25	1000Ω	½	B85102	BTS-1000	
R26	1000Ω	½	B85102	BTS-1000	
R27	150Ω	½	B85151	BTS-150	
R28	22KΩ 5%	½	B83223		
R29	47Ω	½	B83470	BTS-47	
R30	1000Ω	½	B85102	BTS-1000	
R31	150Ω	½	B85151	BTS-150	
R32	2.7Meg	½	B84275	BTS-2.7Meg	
R33	470KΩ	½	B84474	BTS-470K	
R34	47KΩ	½	B84473	BTS-47K	
R35	330KΩ 5%	½	B83334	BTS-330K 5%	
R36	100KΩ	½	B84104	BTS-100K	
R37	22KΩ 5%	½	B83223		
R38	180Ω	½	B84181	BTS-180	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: CORONADO Part No.	IRC Part No.	NOTES
R39	1500Ω	½	B84152	BTS-1500	
R40	4700Ω 5%	½	B83473	BTS-4700 5%	
R41	5600Ω	1	C84562	BTA-5600	
R42	1500Ω	½	B84152	BTS-1500	
R43	33KΩ	½	B84333	BTS-33K	
R44	1Meg	½	B84105	BTS-1Meg	
R45	100Ω	½	B84101	BTS-100	
R46	47000 5%	½	C83472	BTA-4700 5%	
R47	100KΩ	½	B85104	BTS-100K	
R48	1Meg	½	B84105	BTS-1Meg	
R49	22KΩ	½	B84223	BTS-22K	
R50	100KΩ	½	B85104	BTS-100K	
R51	47KΩ	½	B85473	BTS-47K	
R52	100Ω	½	B84101	BTS-100	
R53	1000Ω	½	B85102	BTS-1000	
R54	56KΩ	½	B84563		
R55	100KΩ	½	B84104		
R56	1000Ω	½	B85102	BTS-1000	
R57	33KΩ	½	B84333	BTS-33K	
R58	270Ω	½	B84271	BTS-270	
R59	68KΩ	½	B84683	BTS-68K	
R60	22KΩ	½	B84223	BTS-22K	
R61	22KΩ	½	B84223	BTS-22K	
R62	68KΩ	½	B84683	BTS-68K	
R63	10Meg	½	B85106	BTS-10Meg	
R64A	470KΩ	½	†76X6	BTS-470K	
B	470KΩ	½		BTS-470K	
R65	47KΩ	½	B85473	BTS-47K	
R66	330Ω	1	C84331	BTA-330	
R67	1000Ω	2	B84102	BTS-1000	
R68	47KΩ	½	B84473	BTS-47K	
R69	10KΩ	½	B84103	BTS-10K	
R70	270KΩ	½	B84274	BTS-270K	
R71	1.5Meg	½	B84155	BTS-1.5Meg	
R72	68KΩ	½	B84683	BTS-68K	
R73	820KΩ	½	B84824	BTS-820K	
R74	2200Ω 5%	½	B83322	BTS-2200 5%	
R75	3300Ω	½	B84332	BTS-3300	
R76	2200Ω 5%	½	B83322	BTS-2200 5%	
R77	1000Ω	1	C84102	BTA-1000	
R78A	22KΩ	½		BTS-22K	
B	82000Ω	½	*76X7	BTS-8200	
C	82000Ω	½		BTS-8200	
R79	1.5Meg	½	B84185	BTS-1.5Meg	
R80	470KΩ	½	B85474	BTS-470K	
R81	1.5Meg	½	B84185	BTS-1.5Meg	
R82	2.2Meg	½	B84225	BTS-2.2Meg	
R83	180KΩ	½	B84184	BTS-180K	
R84	10KΩ	½	B84103	BTS-10K	
R85	2.2Meg	½	B84225	BTS-2.2Meg	
R86	820Ω	½	B84821	BTS-820	
R87	2200Ω	½	B84222	BTS-2200	
R88	6800Ω	2	B84682	BTS-6800	
R89	560Ω	½	B84561	BTS-560	
R90	560Ω	½	B84561	BTS-560	
R91	1000Ω	½	B86102	BTS-1000	
R92	100KΩ	½	B84104	BTS-100K	
R93	100KΩ	½	B84104	BTS-100K	
R94	4.7Meg	½	B86475	BTS-4.7Meg	
R95	470KΩ	½	B85474	BTS-470K	
R96	27KΩ	½	B84273	BTS-2700	
R97	6800Ω	1	C84682	BTA-6800	
R98	6800Ω	1	C84682	BTA-6800	
R99	33KΩ	½	B84333	BTS-33K	
R100	3200Ω 5%	1	B83222	BTS-3200 5%	
R101	5600Ω 5%	1	C83562	BTA-5600 5%	
R102	150KΩ 5%	½	B83154	BTS-510K 5%	
R103	220KΩ 5%	½	B83224	BTS-220K 5%	
R104	47KΩ	½	B84473	BTS-47K	
R105	56KΩ	½	B84562	BTS-5600	
R106	470KΩ	½	B84472	BTS-470K	
R107	100Ω	2	D84101	BW-2-100	
R108	12KΩ	5	43X276	1 3/4A-12K	
R109	5.1Ω	½	47X239		
R110	1Meg	1	C85105		
R111	100KΩ	2	D85104	BTB-100K	
R112	10KΩ	5	43X272	1 3/4A-10K	
R113	1000Ω	15	43X275	2D-1000	
R114	350Ω	10	43X273	1 3/4A-350	
R115	270KΩ	½	B85274	BTS-270K	

† Items R64A, R64B, C61A, C61B, C61C are combined in one unit.
♦ Items R78A, R78B, R78C, C66A, C66B, C66C are combined in one unit.

TRANSFORMER (POWER)

ITEM No	RATING PRI	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA: CORONADO	Stancor PART No.	Merit PART No.	Triad PART No	RCA TYPE No	Halldorson PART No.	Thordarson PART No
T1	117VAC	582VCT	5VAC		53X333						
	② 2A	.270ADC	③ 6A								
	SEC. 4	SEC. 5									
	6.3VAC	6.3VAC									
	④ 1.2A	⑤ 8.5A									

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI	RATING DC RESISTANCE SEC.	REPLACEMENT DATA: CORONADO PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	RCA TYPE No.	NOTES
T2	190Ω	110Ω	54X8	A-8125	A-3003	B6702	A-97X	2QW11 ⑤	Vert.Osc.Trans.
T3	469Ω tap	3.5Ω	53X330		HVO-8①		D-32②	232T1 ③	Horiz.Output Trans.
	④-5Ω,	SEC. 2			②		④	& 212R1	
	20,14Ω,	0Ω			& MWC-1		& WC-11		
	23Ω, 39Ω								
T4	1500Ω tap		51X156	A-8141	A-3039	Z1806 ⑤	A-104X	226T1	Vert.Output Trans.
	④4.4Ω					⑥			
T5A	23Ω		9A2274	DY-9A	MDF-72	DF602	T-1Y	21LD2	Horiz.Deflection Coils
B	47Ω								Vert. Deflection Coils
T6	15Ω		9A2262		MWC-6	TW-7	WC-12 ④	213R1	Horiz.Linearity Coil
T7	.8Ω		9A2183	WC-4 ⑦	MWC-2⑦	TW-2		20LR4 ⑦	Width Coil
					⑧	⑦			

① Drill new mounting holes.
② Connect original terminal #6 to new terminal #9, original #5 to new #7, original #4 to new #5, original #1 to new #1. Connect primary of MWC-1 across terminals 3 and 1 and secondary to AFC (if picture is out of phase, reverse secondary).
③ Connect terminal #8 to terminal #7, then connect original #6 to new #9, original #5 to new #7 and 8, original #4 to new #6, original #1 to new #1. Connect primary of TW-6 across terminal 3 and 1 and secondary to AFC (if picture is out phase, reverse secondary).
④ Connect terminal #8 to terminal #7, then connect original #6 to new #9, original #5 to new terminal 7 and 8, original #4 to new #5, original #1 to new #3. Connect primary of WC-11 across terminals 3 and 1 and secondary to AFC (if picture is out of phase, reverse secondary)
⑤ Drill one new mounting hole.
⑥ Connect to coded blue and green terminals.
⑦ Bend clip or use original slider and core.
⑧ Enlarge mounting hole.
⑨ Use Fig. 4 of instruction booklet packed with unit for terminal connections.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI.	IMPEDANCE SEC	REPLACEMENT DATA: CORONADO PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T8	5.8Ω	3.6Ω	51X150H	A-3877	A-2930	S-3X	Z1C01	TS-24S51	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V C. IMP.	REPLACEMENT DATA: CORONADO PART No.	VIKING PART No.	QUAM PART No	NOTES
SP1	10"	PM	3.6Ω	12A480 ①	10J11	10A31	① 6" PM speaker, not used in all Models.
				12A504 ①			② 12" PM speaker used in console Models.
				12A502 ②			

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: CORONADO PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	Ant. Coil	0Ω CT	0Ω	A9A2297-2				Channel 2
B	Ant. Coil	0Ω CT	0Ω	A9A2297-3				Channel 3
C	Ant. Coil	0Ω CT	0Ω	A9A2297-4				Channel 4
D	Ant. Coil	0Ω CT	0Ω	A9A2297-5				Channel 5
E	Ant. Coil	0Ω CT	0Ω	A9A2297-6				Channel 6
F	Ant. Coil	0Ω CT	0Ω	A9A2297-7				Channel 7
G	Ant. Coil	0Ω CT	0Ω	A9A2297-8				Channel 8
H	Ant. Coil	0Ω CT	0Ω	A9A2297-9				Channel 9
I	Ant. Coil	0Ω CT	0Ω	A9A2297-10				Channel 10
J	Ant. Coil	0Ω CT	0Ω	A9A2297-11				Channel 11
K	Ant. Coil	0Ω CT	0Ω	A9A2297-12				Channel 12
L	Ant. Coil	0Ω CT	0Ω	A9A2297-13				Channel 13
L2	Fil.Choke	0Ω		34A-546				
L3	Neutr.Coil	0Ω		31B-396				
L4A	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-2				Channel 2
B	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-3				Channel 3
C	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-4				Channel 4
D	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-5				Channel 5
E	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-6				Channel 6
F	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-7				Channel 7
G	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-8				Channel 8
H	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-9				Channel 9
I	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-10				Channel 10
J	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-11				Channel 11
K	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-12				Channel 12
L	RF. Mixer Grid & Osc. Coil	0Ω		A9A2298-13				Channel 13
L5	Fil. Choke	0Ω		34A-575				
L6	RF Choke	0Ω		31B-295				
L7	1st.Video IF	1Ω		31A-078				
L8	RF Choke	1.3Ω		31B-230				
L9	Fil. Choke	0Ω		9A2033	19-3001	TV-189	4602	1 Microhenry
L10	2nd.Video IF	.3Ω	.3Ω	9A2230	17-1063		6349	
L11	Fil. Choke	0Ω		9A2033	19-3001	TV-189	4602	1 Microhenry
L12	3rd. Video IF	.3Ω	.3Ω	9A2230	17-1064		6350	
L13	Fil. Choke	0Ω		9A2033	19-3001	TV-189	4602	1 microhenry
L14	RF Choke	2.5Ω		9A1979	19-3036	TV-180	4632	36 Microhenries
L15	4th.Video IF	.3Ω		9A2226		TV-101	6187	Includes trap
L16	Series Peaking Coil	7Ω		38A10	19-4060	TV-180 †	6172 †	80 Microhenries, wound on 2.2KΩ resistor
L17	Shunt Peaking Coil	25Ω		38A11	19-3500	TV-188	6174	500 Microhenries
L18	4.5MC Trap	.3Ω		9A2074	20-1004	TV-181	1470	
L19	Series Peaking Coil	2.5Ω		9A1979	19-3036	TV-180	6176	36 Microhenries
L20	Shunt Peaking Coil	9Ω		38A16	19-3075 ▲	TV-181▲	6173 ▲	80 Microhenries, wound on 1.5KΩ resistor
L21	Series Peaking Coil	13Ω		38A12	19-4180	TV-184 †	4644 †	150 Microhenries, wound on 2.2KΩ resistor
L22	Shunt Peaking Coil	14Ω		38A2	19-3180	TV-184	6180	190 Microhenries
L23	1st.Sound IF	2.5Ω		9A2168	17-1031 ▲	TV-123 †	1470A ■	
L24	2nd.Sound IF	1.5Ω	1.5Ω	9A3170		TV-123	6203	
L25	Ratio Det.	3.5Ω	.63CT	9A2269 *	17-1033	TV-116	1468	Tertiary winding-.3Ω
L26	Horiz.Osc.	70Ω		9A2096	19-1576	TV-163	6210	

* Some Models use Ratio Det. part #9A2295 (has numerical terminal identification)
Ratio Det. (part #9A2269) has alphabetical terminal identification)
† Parallel with 22KΩ resistor
▲ Parallel with 1.5KΩ resistor
■ Drill mounting holes
† Detune unused winding
■ Add 47MGMF Cap. externally

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	CORONADO PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L27	.270ADC	42Ω	1.68 Hy.	52X91	C-2326①	C-2996 ①	C-17X ①	C5037 ①	T-26C44①

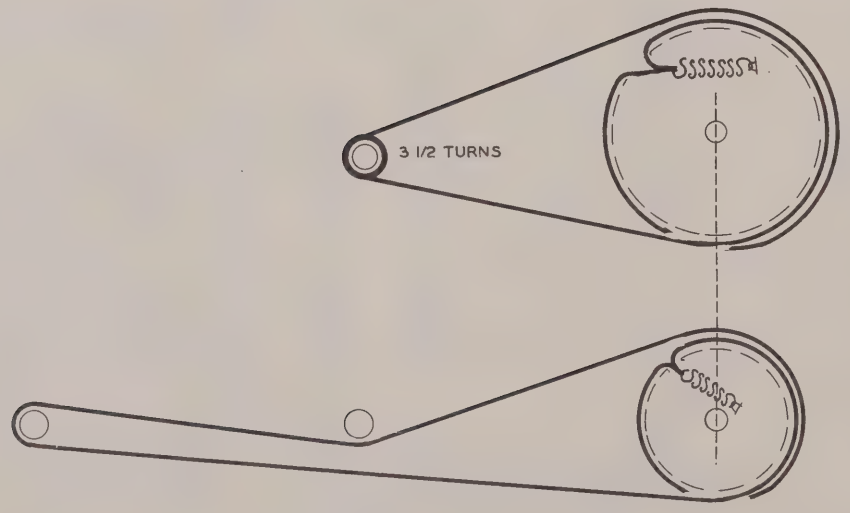
① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			CORONADO PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	4/10A 125V	16X147-3	16X146	313.400 (4/10A-125V)	357001	MDL4/10	4405

MISCELLANEOUS

ITEM No.	PART NAME	CORONADO PART No.	NOTES
M2	Dial Light	7A32	Type #51 - Channel Indicator
M3	Dial Light	7A32	Type #51 - UHF Dial
M4	VHF Tuner	25A-1104	
M5	UHF Tuner	25A-1105	
M6	Trap, UHF Filter		
M7	Crystal		1N72 (1N82 may be used) UHF tuner
M8	Magnet	2A426	Focus and centering
M9	Magnet	2A407	Ion Trap
	Back Cover	S-14X69	
	Dial Glass	58X768	UHF
	Knob	10A820-1	Fine tuning (Maroon)
	Knob	10A821-1	Contrast (Maroon) — MODELS 35TV2-43-9050A, 35TV2-43-9061A, 45TV2-43-9061B
	Knob	10A822-1	Channel Selector (Maroon)
	Knob	10A779	Volume (Maroon)
	Knob	10A820-2	Fine tuning (Beige)
	Knob	10A821-3	Contrast (Beige) — MODEL 45TV2-43-9064A
	Knob	10A822-3	Channel Selector (Beige)
	Knob	10A812-4	Volume (Beige)



UHF DIAL CORD STRINGING

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

POWER

DEAD SET

If filaments fail to light check AC interlock assembly, switch on volume control and T1. If filaments light check M1, V23, V24 and B+ filter and decoupling network components.

SMALL PIX AND / OR DIM RASTER

Substitute V23 and V24. Check B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V19, V20, V21 and V22. Check waveform W17.

If Satisfactory	If Unsatisfactory
Check R109, R110, C92, T3, T5A and other associated components.	Check C82, C84, C85, R103, R104, R106 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V19, V20, V21, V22, V23 and V24. Check picture tube and associated components.

BLOOMING

Check by substitution V19, V20, V21, V22, V23 and V24. Check R109, R110, C92, T3, T5A, picture tube and other associated components.

GENERAL

RASTER SOUND NO PIX

See "Loss of Video".

RASTER NO SOUND NO PIX (VHF)

Substitute V1, V2, V4, V5, V6 and V7. Check associated components.

RASTER NO SOUND NO PIX (UHF)

Substitute V1, V2, V3, V4, V5, V6 and V7. Check associated components. NOTE! It may be necessary to try several tubes in the UHF tuner to find one that will operate satisfactory.

NO RASTER NO SOUND

See "Dead Set".

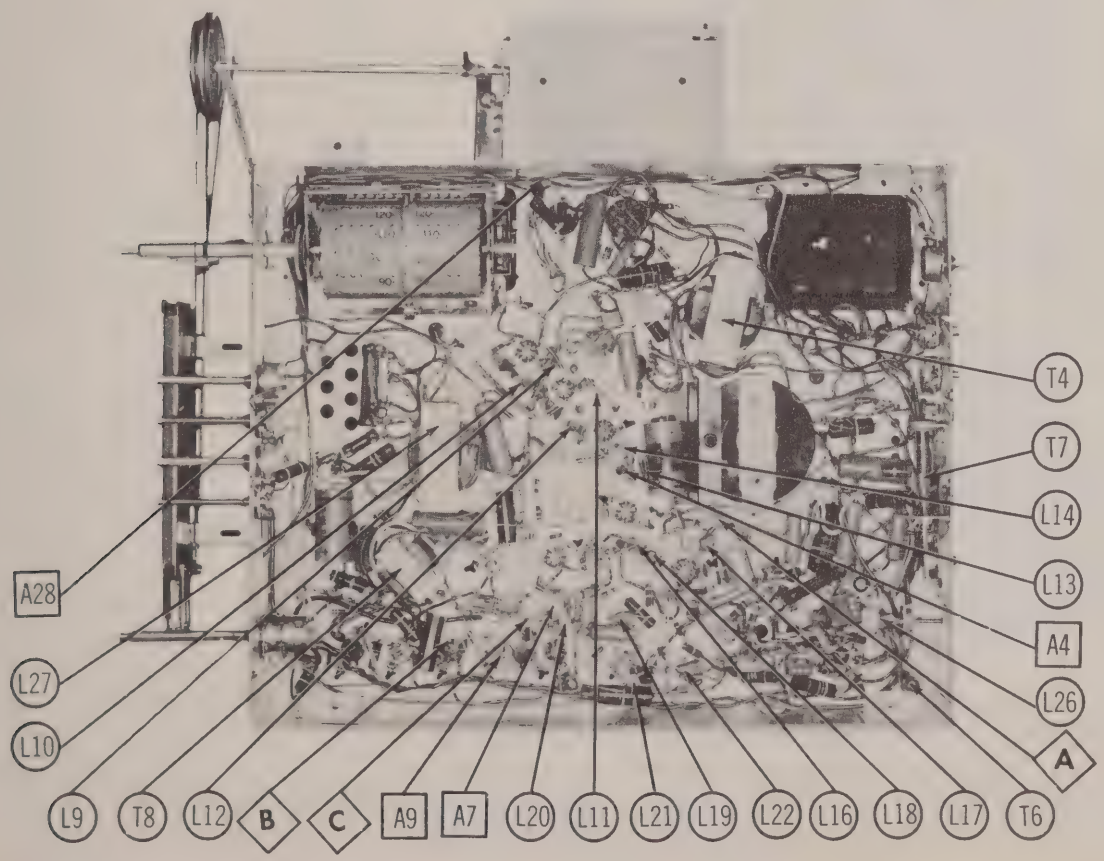
TOTAL LOSS OF SYNC

Check by substitution V16 and V8. Check associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this receiving equipment.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

CORONADO MODELS 35TV2-43-9050A, 35TV2-43-9061A, 45TV2-43-9061B, 45TV2-43-9064A

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

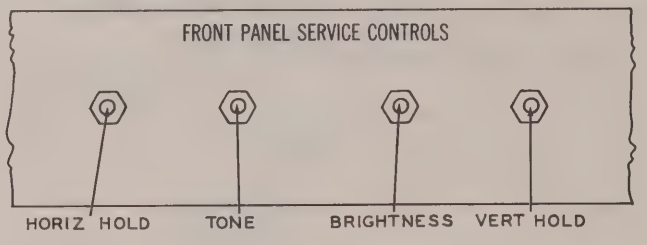
Touch-up adjustments of the RF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the channel selector shaft.

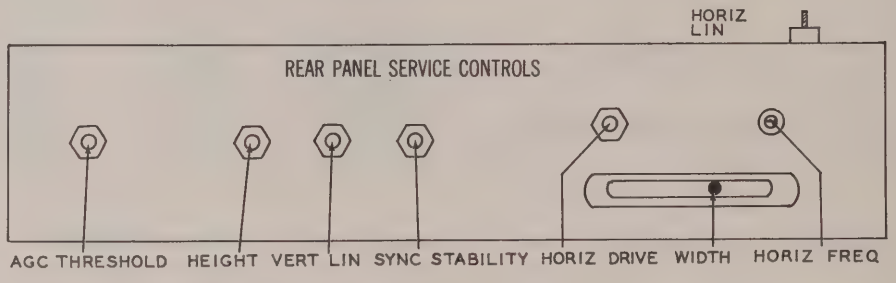
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 4 wood screws holding wood strip at bottom of safety glass. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).





SPECIAL ADJUSTMENTS - SYNC STABILITY CONTROL

Tune set to strongest TV signal available turn the sync stability control clockwise until bending of the picture occurs at the top, then turn counter clockwise until the bending just disappears.

AGC THRESHOLD CONTROL - Tune in strongest TV signal . Turn the control clockwise until overloading appears. turn control counter clockwise until overloading disappears.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal frequency slug (L26) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF detector buzz, adjust the ratio detector secondary (L25) located on top of chassis. (See tube placement chart).

FUSES

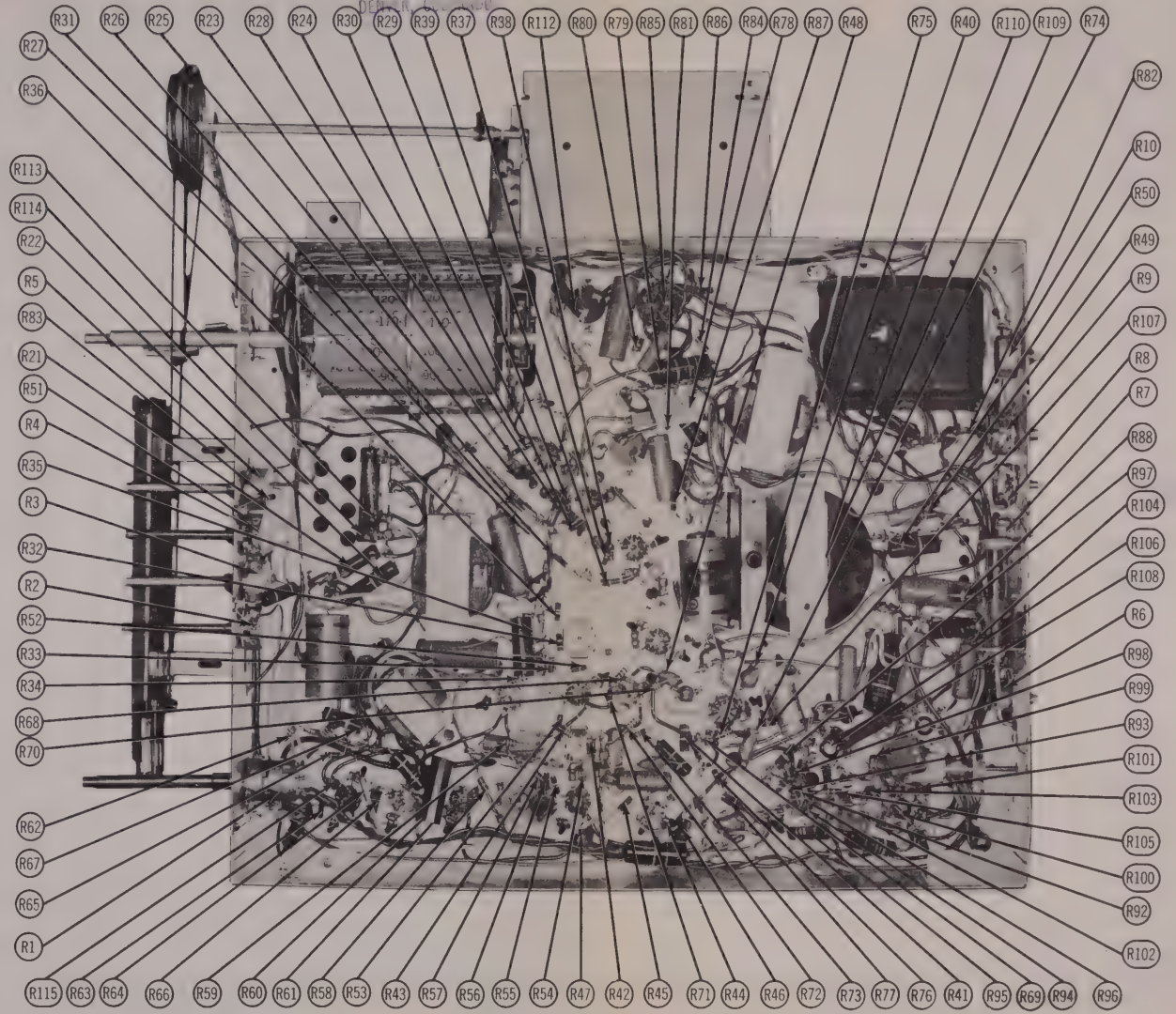
One fuse is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting a magnetic ring around the neck of the picture tube located flush against the yoke. Turn the disk-like knob and at the same time rotate the ring around the tube until picture is properly centered.

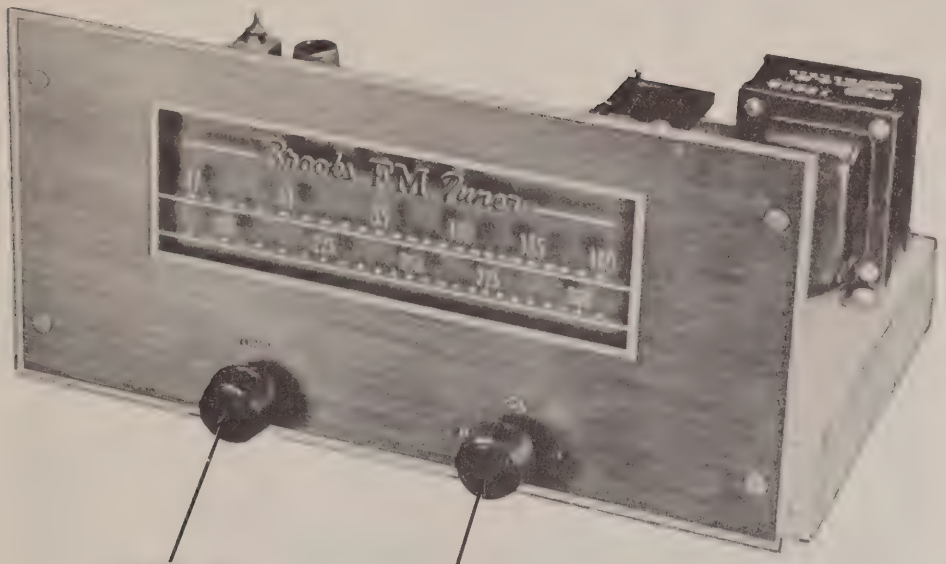
DISASSEMBLY INSTRUCTIONS

1. Remove 4 push on type control knobs from front panel.
2. Remove 2 wood and 2 metal screws. Remove rear cover.
3. Disconnect VHF built-in antenna. Loosen 4 wood screw. Remove VHF and UHF antenna bracket.
4. Disconnect speaker. Remove 4 speaker nuts. Remove speaker.
5. Remove 5 chassis bolts. Remove chassis.



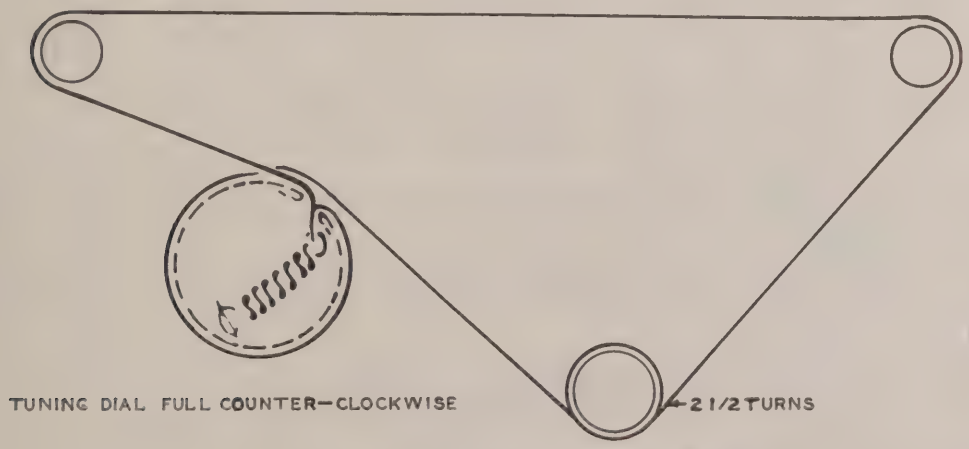
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

BROOKS
MODEL ST-10A



BROOKS
MODEL ST-10A

TRADE NAME	Brooks Model ST-10A
MANUFACTURER	Brooks Laboratories, Inc., 751 Main St., Waltham 54, Mass.
TYPE SET	AC Operated FM Superheterodyne Tuner For Custom Installations
TUBES (Ten)	Types 6CB6 RF Amp., 6J6 Osc., 6BE6 Mixer, (3) 6CB6 IF Amp., (2) 6AU6 Limiter, 6AL5 Discriminator, 6X4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .43 Amp. @ 117 Volts AC
TUNING RANGE	FREQ. MOD. 87-109MC



DRIVE CORD STRINGING

PROPERTY OF
L. F. BLANKENSHIP
3824 MEADE ST.
DENVER, COLORADO

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		BROOKS PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6CB6	6CB6	7CM	
V2	Oscillator	6J6	6J6	7BF	
V3	Mixer	6BE6	6BE6	7CH	
V4	IF Amp.	6CB6	6CB6	7CM	
V5	IF Amp.	6CB6	6CB6	7CM	
V6	IF Amp.	6CB6	6CB6	7CM	
V7	Limiter	6AU6	6AU6	7BK	
V8	Limiter	6AU6	6AU6	7BK	
V9	Discriminator	6AL5	6AL5	6BT	
V10	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

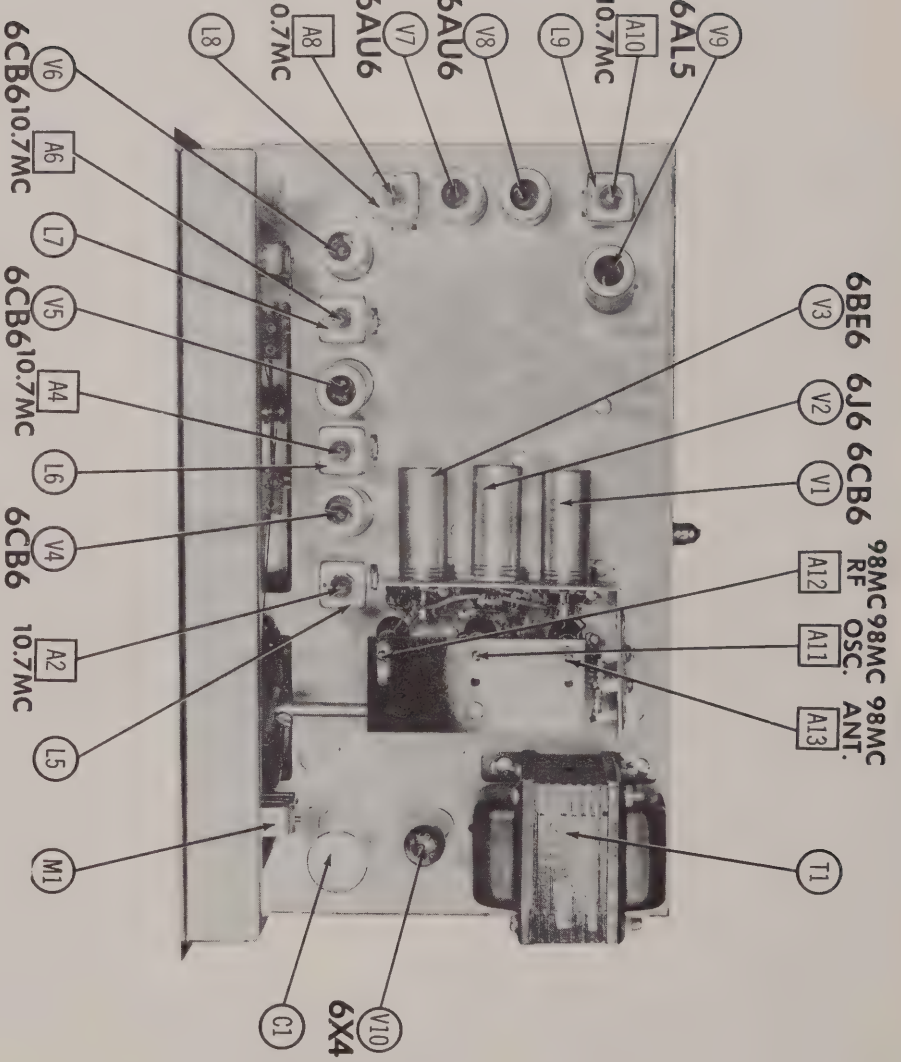
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	BROOKS PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	■30	350		AFH2-83		B031		FP227.3	TVL-2621	
B	▲30	300								
C2	10			SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C3	10			SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C4	10			SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C5	500			SI500	D6-501	TP47	GP2K-501	UC-535	5GA-T5	
C6	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C7	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C8	20			SI20N750	TCN-20	TN05			5TCU-Q2	
C9	10			SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C10	20			SI20N750	TCN-20	TN05			5TCU-Q2	
C11	3			SI3.3NP0	TCZ-3.3	TZ06	NP0K-3R3	ZT-5533	5TCCB-V33	
C12	10			SI10N750	TCN-10	TN01	N750K-100	NT-541	5TCU-Q1	
C13	10			SI10N750	TCN-10	TN01	N750K-100	NT-541	5TCU-Q1	
C14	500			SI500	D6-501	TP47	GP2K-501	UC-535	5GA-T5	
C15	100			SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C16	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C17	500			SI500	D6-501	TP47	GP2K-501	UC-535	5GA-T5	
C18	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C19	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C20	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C21	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C22	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C23	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C24	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C25	50			SI50	D6-500	TP30	GP1K-500	UC-545	5GA-Q5	
C26	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C27	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C28	20			SI20N750	TCN-20	TN05			5TCU-Q2	
C29	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C30	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	
C31	50			SI50	D6-500	TP30	GP1K-500	UC-545	5GA-Q5	
C32	.1	400		P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C33	10000			SI10000	D6-103	TP67	GP2-333-103	DC-511	5HK-S1	Note 1

Note 1. Not used in all Models.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	BROOKS PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	34-011-560	Q13-133	AG-60-Z	B-60-S	U-46	Volume
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	Not Req.	US-26	Attach to R1A

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	BROOKS PART No.	IRC PART No.	
R2	180Ω	1/2		BTS-180	
R3	4700Ω	1/2		BTS-4700	Note 1
R4	10KΩ	1/2		BTS-10K	
R5	27KΩ	1/2		BTS-27K	
R6	330Ω	1/2		BTS-330	Note 2
R7	180Ω	1/2		BTS-180	
R8	10KΩ	1/2		BTS-10K	
R9	27KΩ	1/2		BTS-27K	
R10	180Ω	1/2		BTS-180	
R11	10KΩ	1/2		BTS-10K	
R12	150KΩ	1/2		BTS-150K	
R13	2. 2Meg	1/2		BTS-2. 2Meg	
R14	180Ω	1/2		BTS-180	
R15	180Ω	1/2		BTS-180	
R16	4700Ω	1/2		BTS-4700	
R17	180Ω	1/2		BTS-180	
R18	180Ω	1/2		BTS-180	
R19	4700Ω	1/2		BTS-4700	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	BROOKS PART No.	IRC PART No.	
R20	180Ω	1/2		BTS-180	
R21	180Ω	1/2		BTS-180	
R22	1000Ω	1/2		BTS-1000	
R23	47KΩ	1/2		BTS-47K	
R24	27KΩ	1/2		BTS-27K	
R25	27KΩ	1/2		BTS-27K	
R26	10KΩ	1/2		BTS-10K	
R27	1000Ω	1/2		BTS-1000	
R28	150KΩ	1/2		BTS-150K	
R29	47KΩ	1/2		BTS-47K	
R30	27KΩ	1/2		BTS-27K	
R31	10KΩ	1/2		BTS-10K	
R32	100KΩ	1/2		BTS-100K	
R33	100KΩ	1/2		BTS-100K	
R34	100KΩ	1/2		BTS-100K	Note 3
R35	1000Ω	10		1 3/4A-1000	
R36	4700Ω	1/2		BTS-4700	Note 1

Note 1. Some models may use a single 2200Ω resistor in this application.
Note 2. Some models may use a 180Ω resistor in this application.
Note 3. Some models may use a 150KΩ resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	BROOKS PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC .43A	506VCT .090ADC	6. 3VAC ② 4A		19853	PC-8420①	P-3148 ①	R-10A① ②	P9214	T-26R31U

① Drill new mounting holes.
② Tape 5V winding.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	BROOKS PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	FM Ant. Coil	0Ω						
L2	FM Ant. Coil	0Ω (Tapped)						
L3	FM RF Coil	0Ω						
L4	FM Osc. Coil	0Ω						
L5	1st IF Trans.	. 3Ω	. 3Ω	16492-4	16-3487	FM-254	1463	
L6	2nd IF Trans.	. 3Ω	. 3Ω	16492-4	16-3487	FM-254	1463	
L7	3rd IF Trans.	. 3Ω	. 3Ω	16492-4	16-3487	FM-254	1463	
L8	4th IF Trans.	. 3Ω	. 3Ω	16492-4	16-3487	FM-254	1463	
L9	FM Discrim.	1. 2Ω	1.4ΩCT	15808		FM-253	1464	

MISCELLANEOUS

ITEM No.	PART NAME	BROOKS PART No.	NOTES
M1	Dial light		(2) # 51 bayonet

FIG. 1

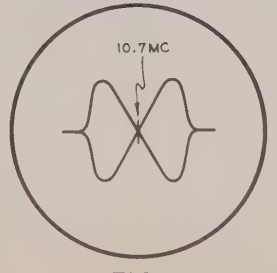
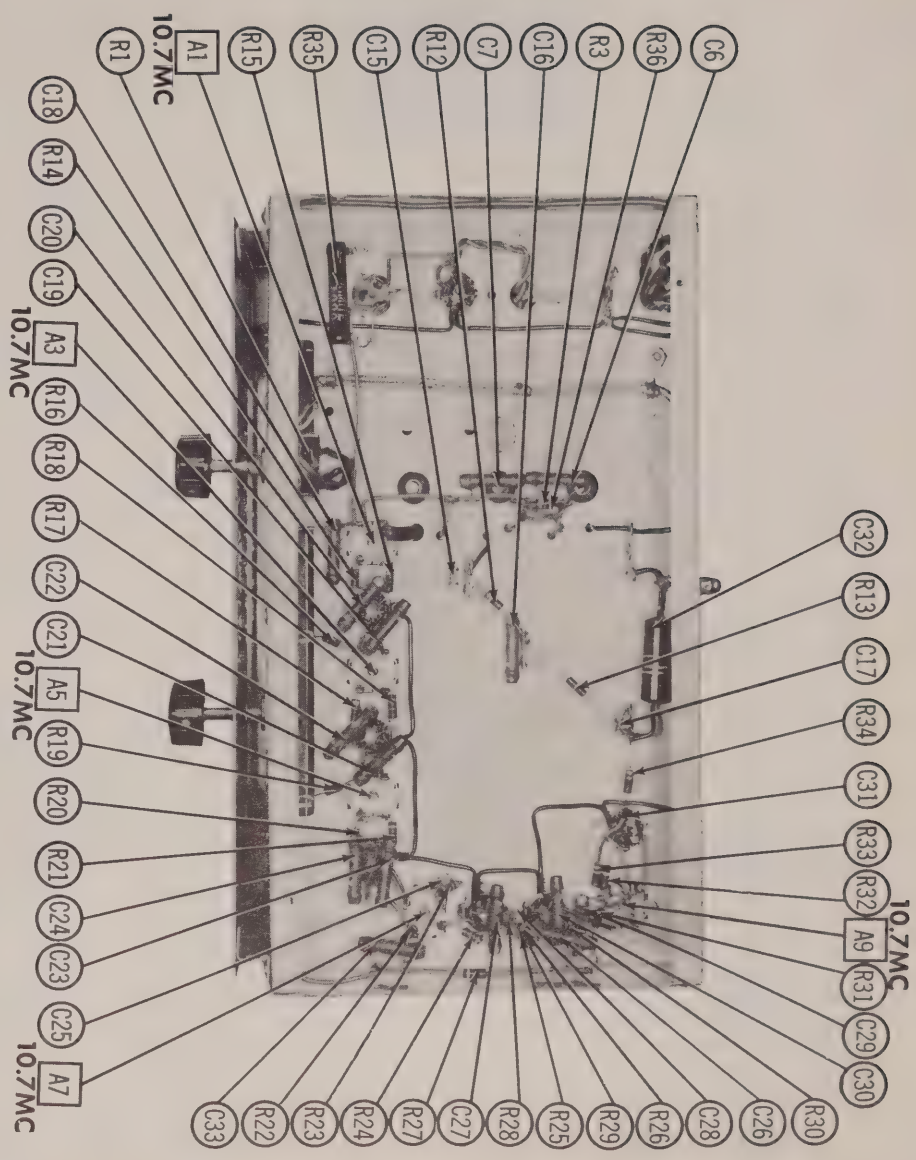


FIG. 2

CHASSIS—BOTTOM VIEW



ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.001MFD	High side to pin 7 (grid) of 6BE6 (V3). Low side to chassis.	10.7MC (Unmod)	Point of non-interference	DC probe to point Ⓐ. Common to chassis.	A1, A2, A3, A4, A5, A6, A7, A8,	Adjust for maximum deflection.
2.	"	"	"	"	DC probe thru 1Meg to point Ⓑ. Common to chassis.	A9	"
3.	"	"	"	"	DC probe thru 1Meg to point Ⓒ. Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to pin 7 (grid) of 6BE6 (V3). Low side to chassis.	10.7MC (450KC Swp)	Point of non-interference	Vert. Amp. thru 10KΩ to point Ⓐ. Low side to chassis.	A1, A2, A3, A4, A5, A6, A7, A8	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
2.	"	"	"	"	Vert. Amp. thru 10KΩ to point Ⓑ. Low side to chassis.	A9	"
3.	"	"	"	"	Vert. Amp. thru 10KΩ to point Ⓒ. Low side to chassis.	A10	Adjust so that 10.7MC occurs at center of crossover lines as in Fig. 2. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

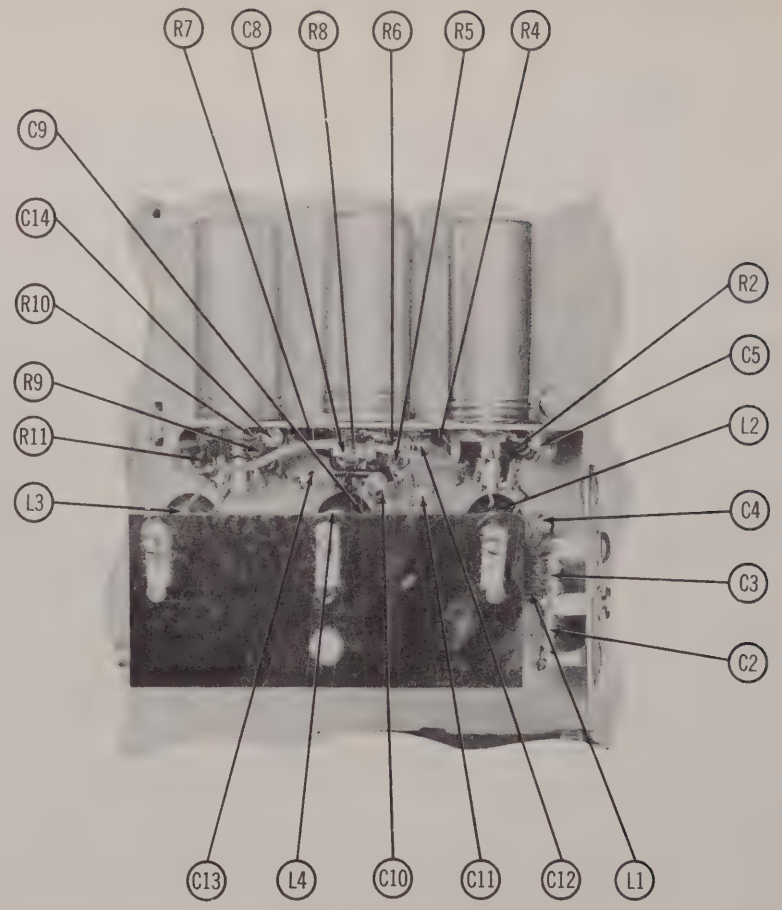
FM RF ALIGNMENT

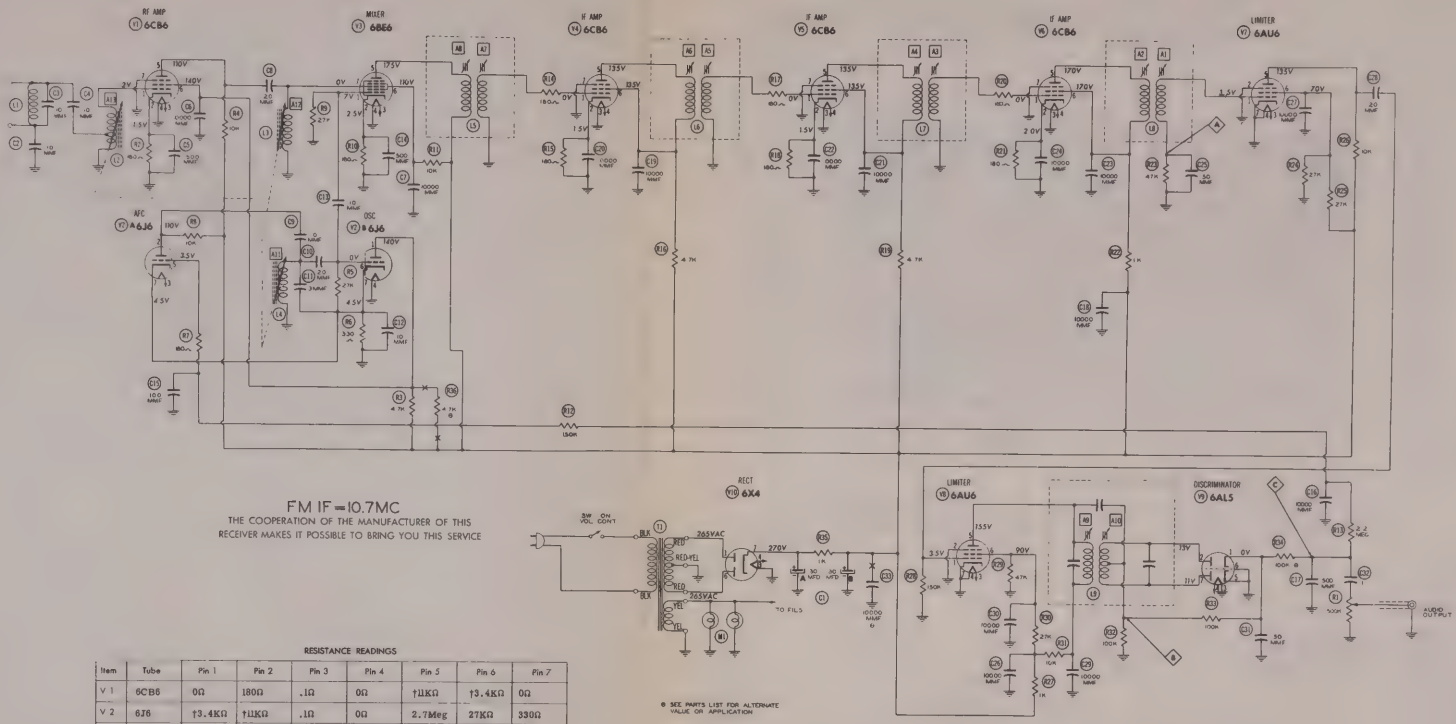
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	270Ω Carbon Resistors	High side thru 270Ω to antenna terminal #1. Low side to antenna terminal #2.	98MC (Unmod)	98MC	DC probe thru 1Meg to point Ⓐ. Common to chassis.	A11, A12, A13	Adjust in order given for maximum deflection.

FM RF ALIGNMENT USING FM STATION AS SIGNAL SOURCE

Tune in an FM station of known frequency near the center of the band. Adjust A11 until dial pointer indicates same frequency as station being received. Adjust A12 and A13 for maximum volume.

TUNER SUB ASSEMBLY





FM IF=10.7MC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6CB6	0Ω	180Ω	.1Ω	0Ω	†1KΩ	†3.4KΩ	0Ω
V 2	6J6	†3.4KΩ	†1KΩ	.1Ω	0Ω	2.7Meg	27KΩ	330Ω
V 3	6BE6	27KΩ	180Ω	.1Ω	0Ω	†1KΩ	†1KΩ	0Ω
V 4	6CB6	180Ω	180Ω	0Ω	.1Ω	†5.7KΩ	†5.7KΩ	0Ω
V 5	6CB6	180Ω	180Ω	0Ω	.1Ω	†5.7KΩ	†5.7KΩ	0Ω
V 6	6CB6	180Ω	180Ω	0Ω	.1Ω	†2KΩ	†2KΩ	0Ω
V 7	6AU6	47KΩ	0Ω	.1Ω	0Ω	†1KΩ	†24KΩ	0Ω
V 8	6AU6	150KΩ	0Ω	.1Ω	0Ω	†12KΩ	†28KΩ	0Ω
V 9	6AL5	200KΩ	100KΩ	0Ω	.1Ω	0Ω	0Ω	100KΩ
V 10	6X4	145Ω	INF	0Ω	.1Ω	INF	150Ω	10KΩ

† MEASURED FROM PIN 7 OF V10

* SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

1. DC voltage measurements taken with vacuum tube voltmeter. AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to chassis as negative.
4. Line voltage monitored at 117 volts for voltage readings.
5. Nominal tolerance on component values is ±20% unless otherwise specified.
6. Values may vary as much as ±10% on voltage and resistance readings due to variation of ± 10% on voltage and resistance readings.
7. Volume control at maximum, no signal applied for voltage measurements.

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COLLARO
MODELS 3RC-531, 3RC-532

Figure 1. Model 3RC-531

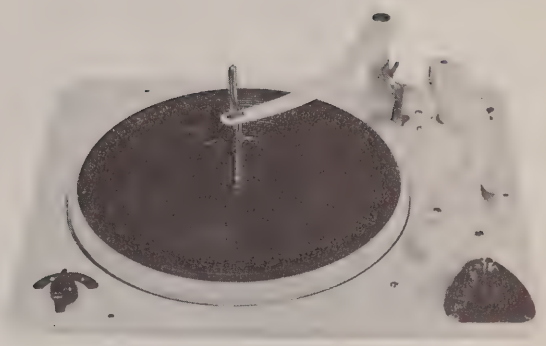

Figure 2. Model 3RC-532

COLLARO
MODELS 3RC-531, 3RC-532

GENERAL INFORMATION

The Collaro Record Changer Models 3RC-531 and 3RC-532 are fundamentally identical in construction. Both are three speed units, the major difference being that Model 3RC-531 is a non-intermixing changer while Model 3RC-532 is an intermixing unit incorporating a trip lever which gives automatic pickup positioning for 10" and 12" records, allowing them to be mixed in any order.

These changers automatically shut off after the last record has been played.

Connect these units only to an outlet supplying 117 volts, 60 cycle AC unless otherwise specified.

Manufactured by:

Collaro Limited
Ripple Works, By-Pass Road
Barking, Essex

Distributed in U. S. by:

Rockbar Corporation
211 East 37th Street
New York 16, N. Y.

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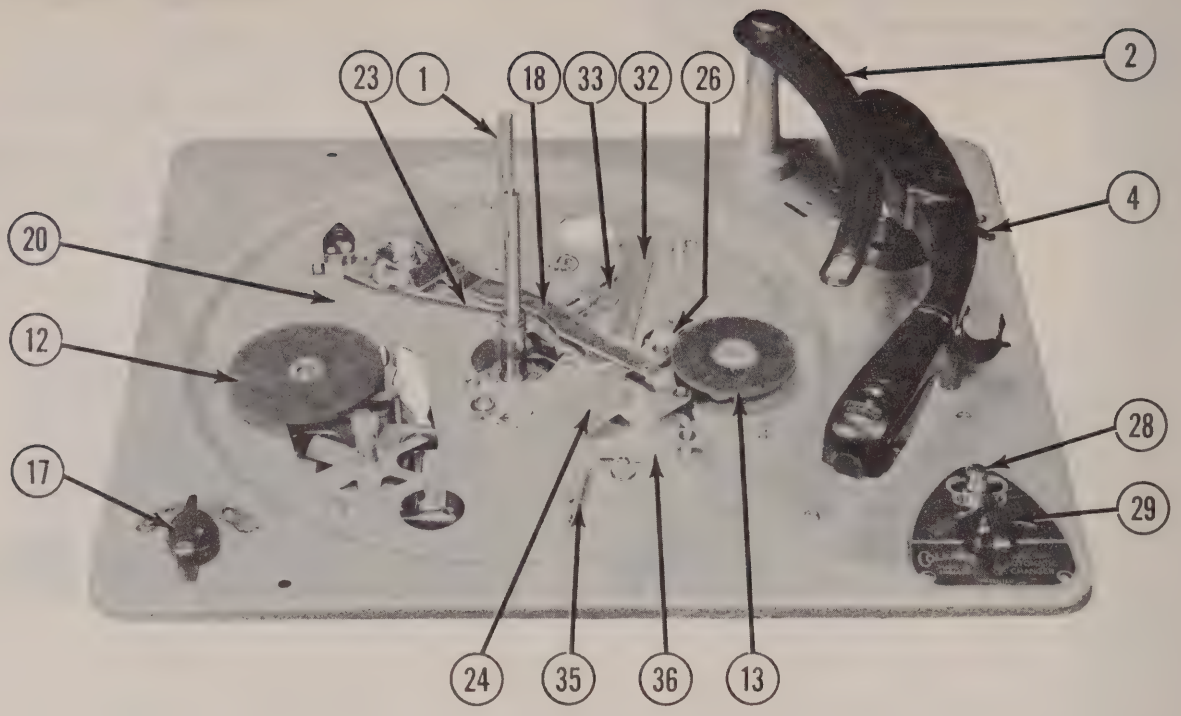

Figure 3

OPERATING INSTRUCTIONS

Capacity-

These Collaro changers will play up to nine records. In the case of Model 3RC-532 10" and 12" records, of the same type, may be played intermixed. 7" records cannot be intermixed with other sizes. A position control knob (28) is provided with Model 3RC-531 and must be preset to the particular position equivalent to the size of the record to be played. In both models the speed control knob (17) must also be preset to give an appropriate turntable speed.

To Load-

To load records, the balancing arm (2) is lifted out of engagement with spindle (1) and then swung to the right until it is clear of the turntable. Records, up to a maximum of nine in number, are then placed on the spindle in the order in which they are to be played. The slot in the record balancing arm should then be engaged with the spindle, and the arm allowed to rest on top of the stack of records.

NOTE: Do not attempt to intermix 33 1/3, 45 or 78 RPM records by operating speed change knob (17) while the changer is running.

To Start-

To start the machine, after checking that position and speed controls are correctly set, control knob (29) is turned fully to the left, held momentarily, and then released. After playing the last record, the pickup arm is automatically lifted from the record and the supply to the motor is switched off.

To Unload-

To unload records after they have been played, the balancing arm (2) is lifted out of engagement with the spindle and swung to the right until clear of the records. The complete stack of records may then be lifted straight up and off the spindle.

Rejecting-

Any record may be rejected during playing by turning control knob (29) gently to the left. The pickup arm will immediately lift from the record, and the next record will be released and commence to play.

Stopping-

The changer may be stopped at any time by turning control knob (29) fully to the right and releasing. The pickup arm will immediately lift from the record and swing to its outward position, when the supply to the motor will be automatically switched off.

SPECIAL FEATURES

Muting-

The pickup cartridge is muted during the change cycle, thus avoiding the reproduction of undesirable noises during the interval between records, and also avoiding the unpleasant "running down" effect due to slowing of the turntable when a record is rejected or when the "Stop" control is operated. The pickup cartridge, however, becomes "live" again when the machine switches off.

Retractable Drive-

Rubber tired pulleys (12 and 13) are automatcally retracted when the unit is switched off. The development of flats on the tires, due to prolonged contact under pressure during periods of disuse, and consequential noisy running and unevenness of turntable speed are thus positively avoided.

CHANGE CYCLE

It is recommended that the change cycle operation be observed by rotating the turntable by hand.

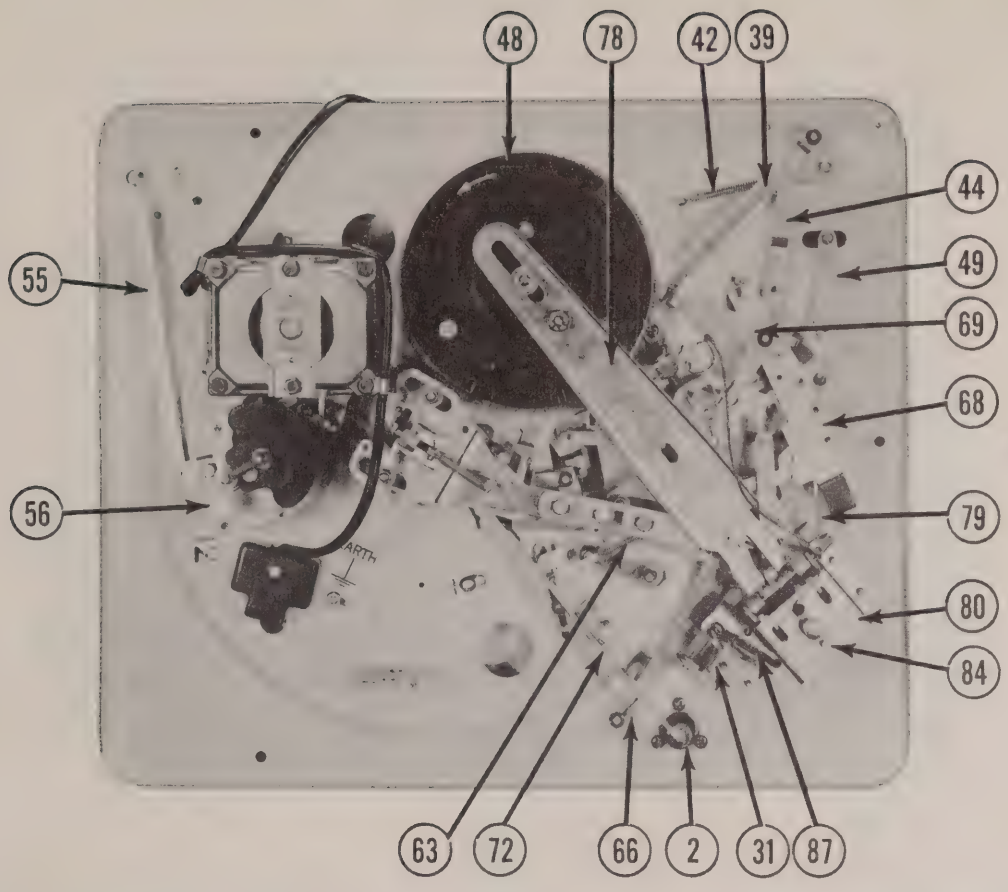

Figure 4

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The action described below can then be readily followed and the function of each part more easily understood.

This changer is provided with what is known as a velocity trip mechanism. The change cycle is started by the faster inward motion of the pickup arm when the needle enters the lead-out groove at the end of a record.

The pickup arm assembly and the pickup tripping arm (41) are secured at opposite ends of the pickup arm shaft and bearing assembly (30) so that they move in unison. As the pickup arm nears the end of a record, the pickup tripping arm (41) pushes the push trip lever (64), which in turn carries striker arm (58) in toward the turntable hub. Striker arm (58) is fed inward by the friction provided by its own weight resting on the curved end of push trip lever (64).

While a record is playing, the small motions of striker arm (58) are not sufficient to trip the mechanism because, on each revolution of the turntable, the wiping action by the turntable hub projection (point "A" on exploded view) moves striker arm (58) back far enough to clear the hub projection.

When the needle enters the lead-out groove, causing the pickup arm to advance rapidly toward the spindle, striker arm (58) is moved far enough to definitely engage the turntable hub projection (point "A" on exploded view). As the hub projection engages with striker arm (58), the striker arm is pushed away from the turntable hub (toward the pickup arm) far enough to contact and push pin (point "B" on exploded view). This action releases swing bracket locking lever (26) from slide bar (32) which, in turn, allows swinging bracket (50), carrying cycle drive wheel (13), to move outward through action of spring (25). Since the turntable is rotating, the cycle drive wheel (13) also rotates, starting main cam (48) to revolve by action of the gear train associated with swinging bracket (50).

Simultaneously, the main slide (78) starts its forward travel, by following the movement of the cam follower (78A), and the cam surfaces (point "C" on exploded view) ride up on rollers (85) lifting the pickup arm clear of the record. The pickup arm actuating lever (74A) is now pulled forward by main slide (78), swinging the pickup arm clear of the turntable.

At this time, the spindle actuating lever (89A) moves towards the turntable hub (90) and contacts the spindle slide (94), which in turn, is moved far enough to allow the record selector pawl (92) to ride down the incline on the spindle slide (point "D" on exploded view). The record selector pawl (92) now rises vertically until its upper end engages the center hole of the lower-most record in the stack and then moves sideways sufficiently to push the record off the spindle shelf.

During this sequence of operations the main slide (78) has reached its extreme forward travel and now starts moving toward the rear of the changer. As this takes place, the pickup arm actuating lever (74A), which is connected to main slide (78), also moves towards the rear of the changer and by engaging with the pins in the pickup arm actuating plate (74) moves the pickup arm in over the record.

At this time, the stud (point "E" on exploded view) on the end of the pickup positioning arm (73) engages with one of the slotted tabs (65) on the pickup arm positioning plate, thus stopping the inward travel of the pickup arm. The spring loaded rollers (85)

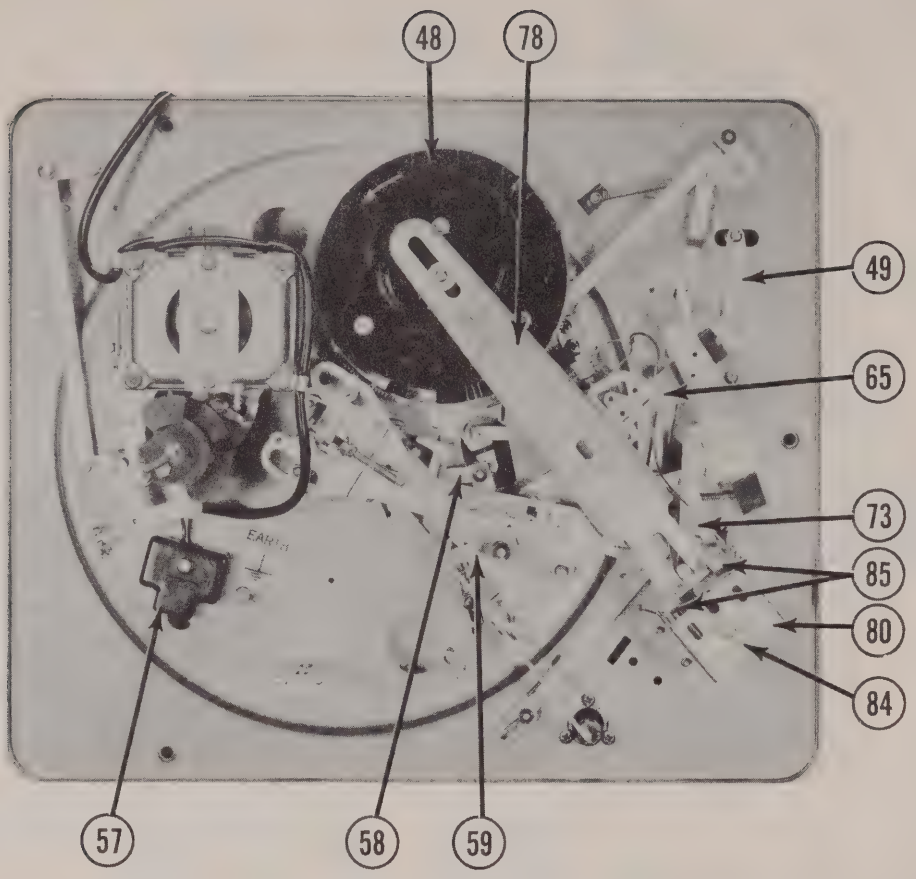

Figure 5. Underside of Model 3RC-531. Note the manually operated position control lever (49) which must be set to the position corresponding to the size record to be played. With Model 3RC-532 positioning is entirely automatic for 10" and 12" records. Note also that items (31, 63, 69, 79, 86 and 87) are not employed on this model.

ride down the cam surface (point "C" on exploded view) lowering the pickup arm to the record.

As the bakelite cam (48) nears the completion of its course, the innermost stud on the cam drive gear (47) rides against the cycle release cam (52), and in so doing, pivots the cycle release cam (52) far enough to release it from the lower middle stud on slide bar (32), thus allowing the slide bar to be pulled forward by action of spring (35). Since the notch in the swing bracket locking lever (26) is engaged with the top stud on slide bar (32), the swing bracket locking lever (26) is also pulled forward pivoting swing bracket (50), which is associated with cycle drive wheel (13), away from the turntable rim. The change cycle is now completed and the pickup arm is free to ride across the record until the needle enters the eccentric tripping groove, at which time, the next change cycle will be started.

As soon as the last record has been dropped, the record balancing arm (2) drops below the shelf on spindle (1) and the balancing arm shaft contacts shut-off lever (72). The balancing arm shaft, when in this position, lifts the lower forked end of shut-off lever (72) into contact with the underside of the baseplate. When the last record has finished playing, the change cycle starts again; however, this time, the automatic stop trip lever (33) moves in behind the stud on shut-off link (23) and the notch in the cycle release cam (52) is prevented from engaging with the lower middle stud on slide bar (32). As soon as the pickup arm has reached a position directly over the arm rest (9), the front lower stud on slide bar (32) clears the drive gear cam (47A) allowing slide bar (32) to return to its forward position by action of spring (35). As slide bar (32) moves forward it carries the swing bracket locking lever (26) with it, which in turn, pivots the swinging bracket (50) and cycle drive wheel (13) away from the turntable rim, thus stopping the cycling mechanism.

Simultaneously, the automatic stop trip lever (33) contacts shut-off link (23) and releases it from its notch in the baseplate. This permits idler wheel (12) to be disengaged from the turntable rim and for the motor power switch to be opened by action of spring (27), thus switching the machine off.

ADJUSTMENTS

Needle Set-Down-

The pickup arm is located to the mechanism underneath the unit plate by means of a spring-loaded roller which normally engages a slot in the pickup tripping arm (41). This is to prevent damage or strain to the mechanism should the pickup arm be inadvertently moved sideways by hand, i.e., while changing the pickup head or stylus, such movement causing the roller to disengage from the slot. If left so displaced, the set-down position will be affected. It is, therefore, important to ensure that the roller is located in the slot before determining whether adjustment of the set-down position is necessary. To do this, bring machine to switched-off position, move pickup arm inwards until its head touches spindle and then move outwards to position over pickup arm rest (9). It will be distinctly felt when the roller springs into position in its slot.

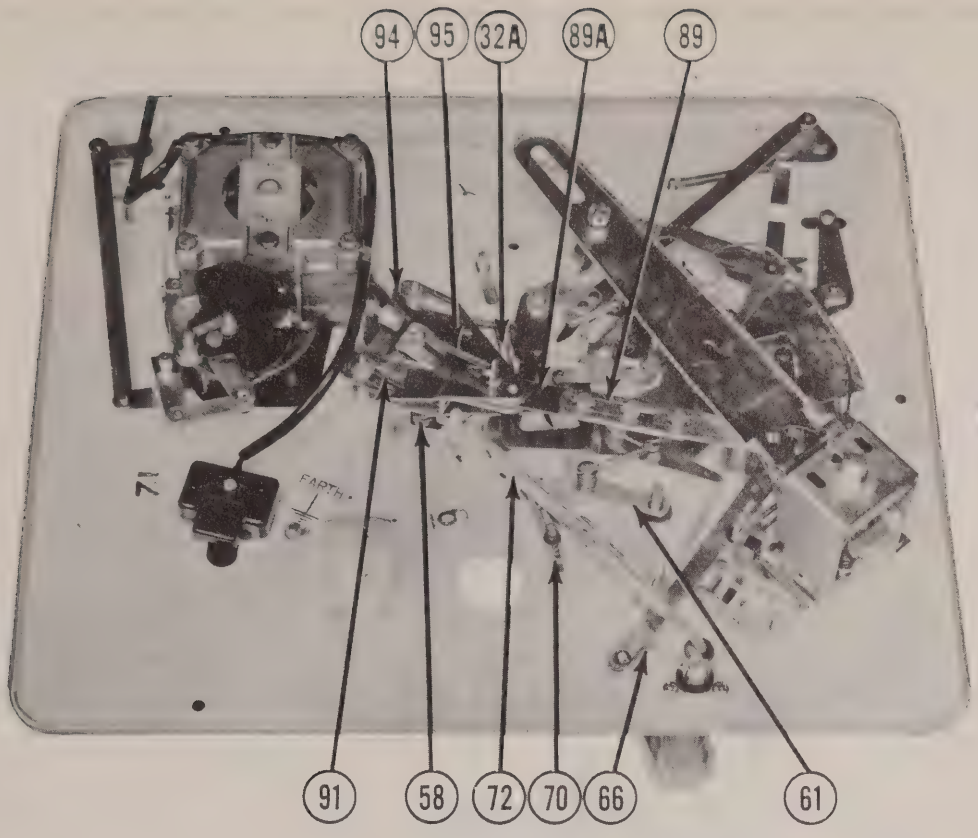

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Figure 6

CAUTION: Attempting to operate the changer while the pickup arm is clamped to its rest may result in displacement of the pickup arm set-down position as described above.

The position at which the needle lands on the record may be adjusted by means of screws (7). To move needle set-down point inward, loosen the left-hand screw and tighten the right-hand screw the same amount. To move needle set-down point outward, reverse the above procedure.

NOTE: This adjustment is very sensitive; turn the screw only about one-eight of a turn at a time until the desired position is obtained, and finally make sure that both screws are really tight. This adjustment affects equally all positions (whether for 7", 10" or 12" records). Independent adjustment is provided for 10" and 12" records by means of slotted tabs in the positioning plate (65) which act as stops for these positions. By bending these tabs slightly inwards or outwards the needle set-down position will be correspondingly affected.

Pickup Arm Height Adjustment-

Minor adjustments may be made by means of screw (A1) (Figure 9). Turning this screw counter-clockwise will increase the lift of the pickup arm and vice-versa. Correct adjustment is when the upper side of the pickup head clears the underside of a stack of records by 1/8" when the pickup arm is in its fully lifted position.

Major adjustments may be made as follows:

(Refer to exploded view and Figure 9).

1. Allow the changer to complete a cycle and with the pickup arm resting on a record switch off the AC supply.

2. Adjust screw (A1) so that the underside of the pickup head (not the needle) comes level with the turntable covering.

3. Cycle changer to see if upper side of pickup head clears the underside of a stack of records by 1/8" when the pickup arm is in its fully lifted position. If not, loosen locknut and adjust screw (84). Retighten locknut securely and recheck all adjustments.

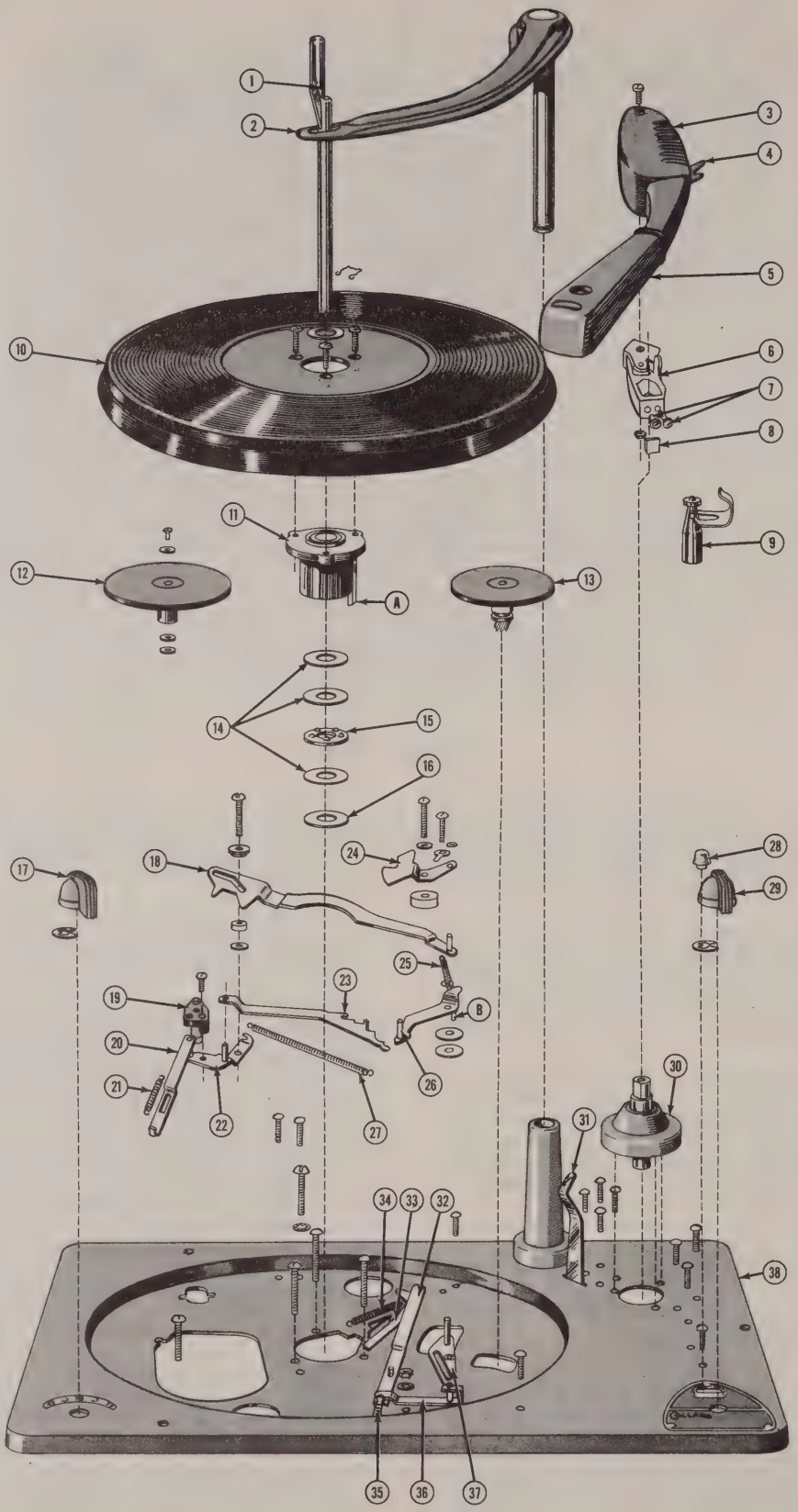
NOTE: Adjustment of screw (A1) affects equally both height to which pickup arm is lifted and the extreme depth to which it may fall. Adjustment of screw (84) affects height only. Hence it is essential to adjust screw (A1) correctly before adjusting screw (84).

Needle Pressure (Refer to Figure 9)-

1. The Collaro is designed to track at as little as 3 grams, however, most present day cartridges are designed to track at from 5 to 12 grams. Before attempting to adjust the needle pressure refer to the cartridge manufactures specifications for the recommended needle pressure.

2. Set the weight compensating control (4) in the "LP" position. Use a suitable gram scale and check the needle pressure at the point where the needle lands on a record. When the needle pressure is obtained for the "LP" position, the pressure for the "Std" position will also be correct.

The needle pressure may be adjusted, if necessary, as follows:



A PHOTOFACT "EXPLODED" VIEW

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Figure 7A. Exploded View of Parts Above Baseplate.

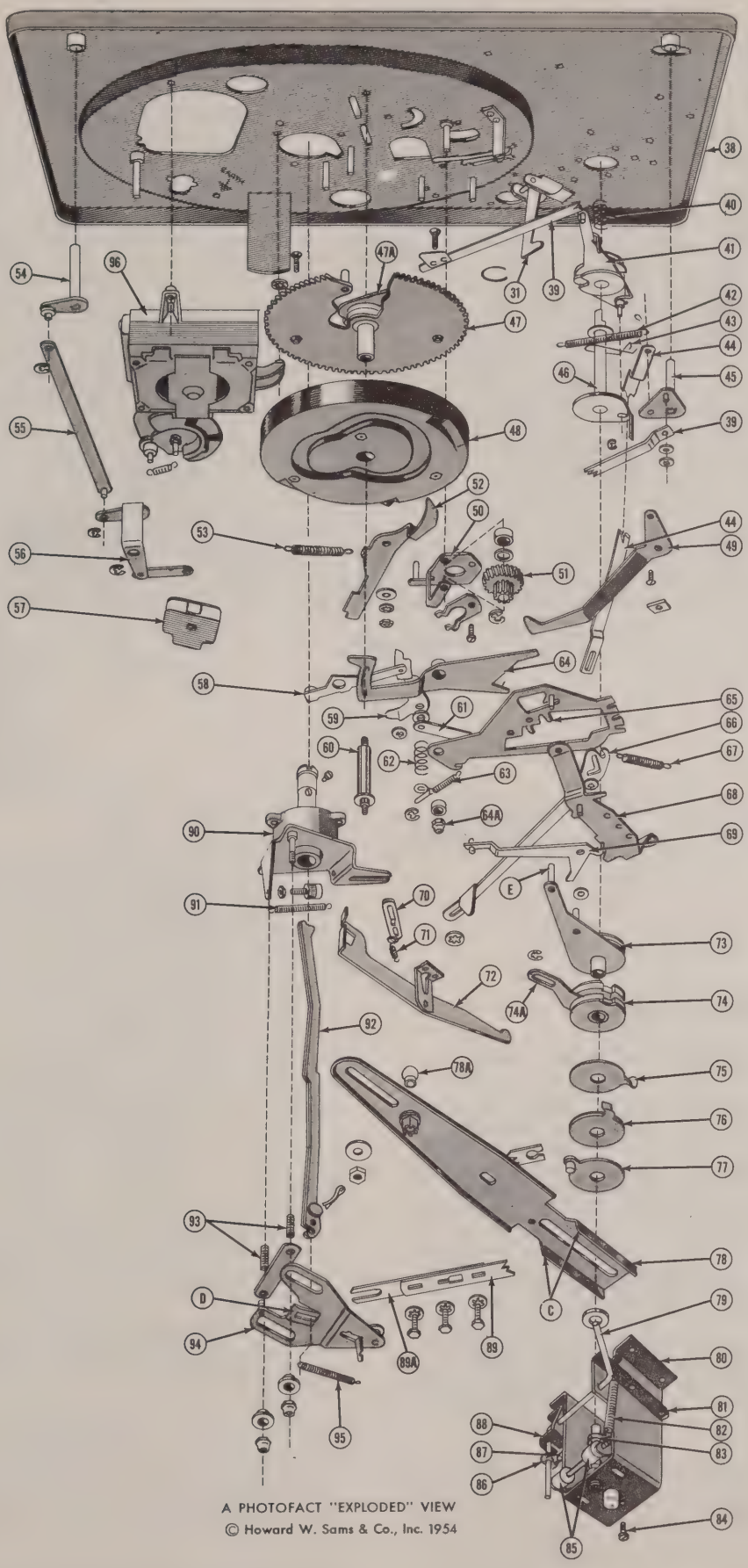

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Figure 7B. Exploded View of Parts Below Baseplate.

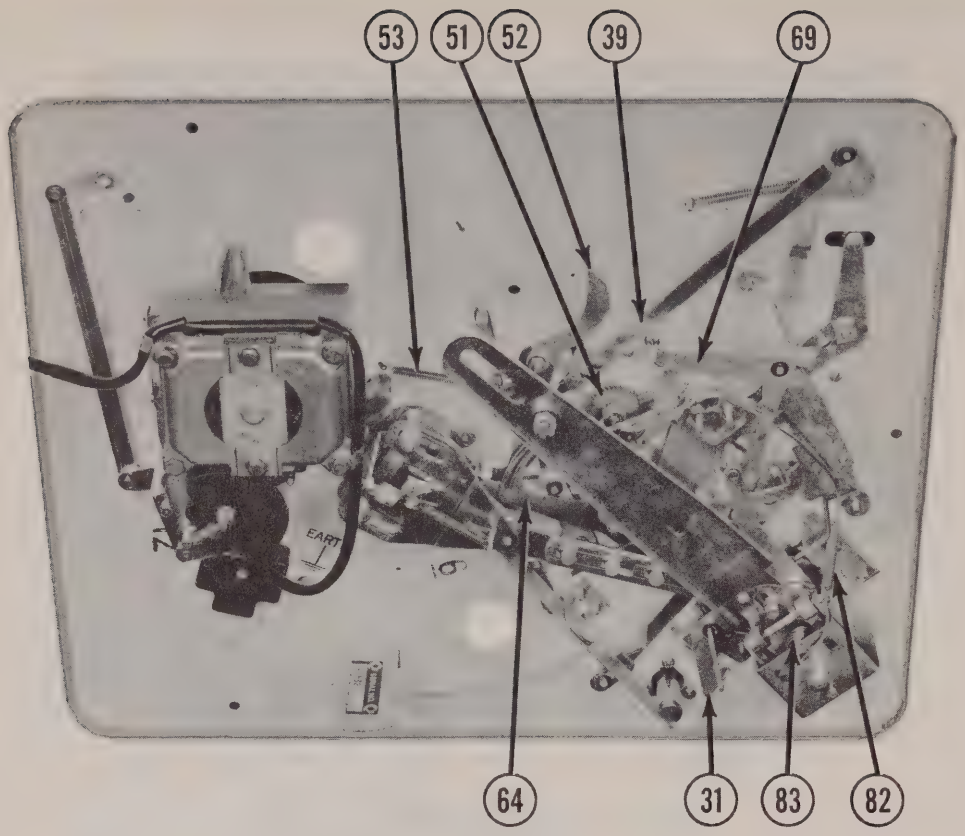

Figure 8

Loosen screw (A2), then turn adjustment screw (A3) clockwise to decrease needle pressure or counterclockwise to increase pressure. After adjustment is made tighten screw (A2).

TROUBLES

Record Dropping (Refer to Figure 10)-

1. More than one record drops at a time.

(A) If more than one record drops at a time examine the center holes of your records. If these are badly worn their use should be avoided. Also make sure that the record retaining slide (A) drops freely under its own weight. If not, it is probable that some foreign matter has become lodged between the slide and the side of the groove in which it works. This may best be dislodged by means of a thin razor blade. Grease or oil on the slide may also be the cause of its failure to drop freely. In this connection, care should be taken if ever the turntable is removed, to see that grease or oil from turntable bearing is not deposited on the slide. Carbon tetrachloride or other solvent applied with a small brush should be used to clean the parts if this cause of failure is suspected.

(B) Too great a projection of the record selector pawl (B) above step (C) may result in two records dropping at once (especially thin records of the long-playing variety). If the projection is excessively great it may result in records failing to drop by restricting the sideways movement of the record selector pawl.

2. If records fail to drop.

(A) Worn or chipped center holes can be the cause, but if failure in this respect occurs when using undamaged records, the action of record selector pawl (B) should be observed. This should first of all rise vertically until its upper end engages the center hole of the lower record in a stack and then move sideways enough to push the record off step (C). Failure of pawl (B) to rise vertically before starting its sideways movement will result in inconsistant dropping of records, and may be due to: Weakening or displacement of spring (95) or the lower end of the record selector pawl (92) binding in the slot through which it protrudes. The split pin (X) may be the cause of such binding if its ends are not spread open sufficiently to prevent partial rotation of the pin.

(B) Insufficient sideways movement of the record selector pawl (B) to push the record off step (C) could be due to: Excessive projection of pawl (B) above step (C) or the record selector pawl itself having been accidentally bent.

(C) Too small a projection of the record selector pawl (B) above step (C) may result in records failing to drop.

(D) Excessive engagement between stop (Y) and the lower end of record selector pawl (92) when at the extreme of its sideways movement can restrict the sideways movement of the upper end of pawl (B) and result in records failing to drop.

(E) Make sure sliding plate (94) is returned freely and positively by action of spring (91).

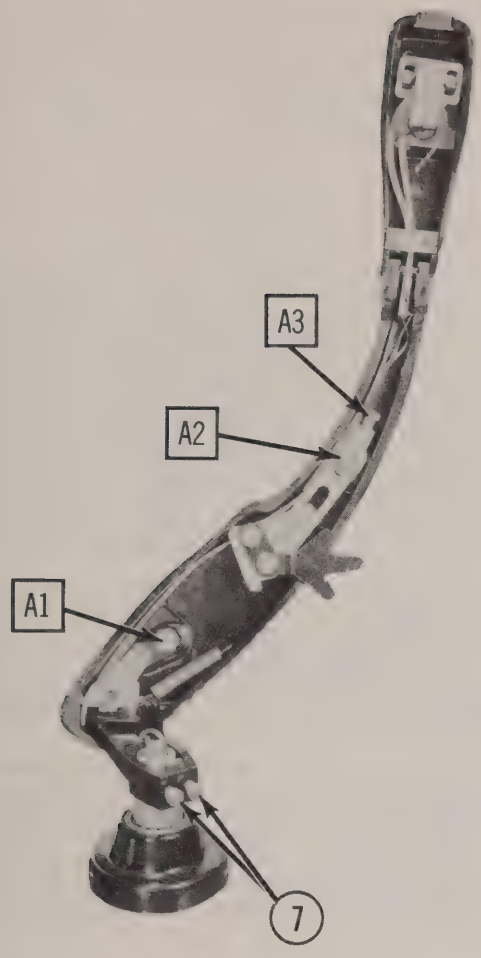

Figure 9

Failure in this respect will result in inconsistent record dropping.

ADJUSTMENTS

The following procedure should be followed if the record dropping mechanism has been dismantled or its adjustment disturbed in any way.

1. Turn the bakelite cam (48) in the direction indicated by arrow in Figure 5 until record selector pawl (B) has started to move sideways.

2. Adjust the pair of self-locking nuts (Z) so that the upper edge of record selector pawl (B) projects a little less than 1/16" above the flat part of step (C). When making this adjustment be sure to adjust both nuts (Z) equally so as to keep the sliding plate (94) level. Also be sure to push record selector pawl (B) gently downwards before measuring its projection above step (C) so as to take up any free movement.

3. Loosen nut (W) and screw stop (Y) inwards until there is a definite gap between it and the lower end of record selector pawl (92) when the latter is pushed towards it as far as it will go. Turn bakelite cam (48) in direction of arrow (Figure 5) until the main slide (78) is at the extreme of its inward movement. With the cam still held in the same position, adjust stop (Y) until it barely touches the lower end of the record selector pawl (92), and lock with nut (W).

Change Fails To Shut-Off After Last Record Has Been Played-

1. Balancing arm (2) is not falling to its full extent and making contact with lever (72). This is due to the balancing arm shaft sticking in its housing, and this should be freed by cleaning thoroughly. Remove the spindle if necessary by first removing the wire retaining ring at the bottom of the shaft. Use of oil is not recommended.

2. Lever (72) is not working freely up and down. The balancing arm shaft should, when fully dropped, lift the lower forked end of lever (72) into contact with the underside of the baseplate, thus preventing the notch in cycle release cam (52) from engaging with pin (32A, Figure 6). This allows slide (32) to return under action of spring (35), thus switching the machine off.

3. The auto-stop trip lever (33) is not working freely under the action of its spring (34), which may have been accidentally stretched or displaced.

Changer Shuts-Off When Needle Lands On Last Record-

1. Check to see if the record balancing arm (2) has become bent upwards, thus allowing the balancing arm shaft to fall into partial engagement with lever (72) while there is still one record resting on the spindle shelf. Loosening of the staking holding the balancing arm (2) to its shaft may have a similar effect.

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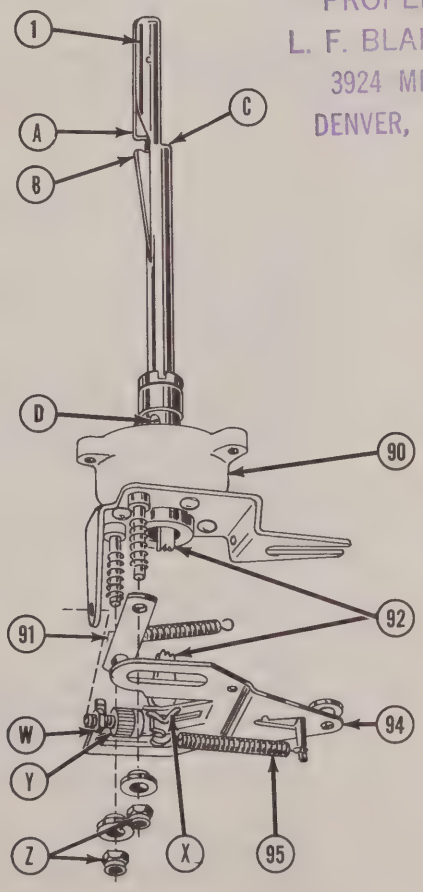

A PHOTOFACT "EXPLODED" VIEW

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Figure 10

(A) Correct operation will be obtained by setting the balancing arm (2) so the slotted end drops about 3/16" below the spindle shelf when the last record drops.

Changer Does Not Cycle When Needle Reaches End Of Record-

1. Check to see if self-locking nut (64A) is set so that the striker arm (58) rests in a horizontal position with its free end just clearing the bottom of the diecast housing (90) carrying the turntable bearing stud.

2. Make sure that striker arm (58) is pivoting quite freely, as it is only fed inwards by the friction provided by its own weight resting on the curved end of lever (64).

3. Check to see that swinging bracket (50) carrying drive pulley (13) is not restricted in its movement. This could be caused by damage or displacement of spring (25).

Operation Of Reject Knob Fails To Bring Change Cycle Into Operation-

1. Check items described in paragraph 3 above.

Interruption Of Change Cycle-

If the change cycle is interrupted between records (i.e. the turntable continues to revolve but the pickup arm remains stationary over its rest) it will be found that operation of the "Reject" knob will cause the cycle to be completed. The cause of this fault is as follows:

1. Failure of notch in cycle release cam (52) to engage with pin (32A) Figure 6. This may be due to:

(a) Cycle release cam (52) not working freely.

(b) Spring (53) may be weakened or displaced.

(c) Pin (32A) may be loose in slide bar (32) into which it is rivited.

Changer Continues To Cycle-

If the change mechanism cycles continuously without allowing each record to play to the end, the cause may be associated with failure of the control knob (29) to return to its central position under the influence of its spring (42). This causes pin (26) to strike against the edge of trip cam (24) at the end of the change cycle, thus tripping the mechanism back into cycle again. To test whether this is the cause, turn the knob very slightly towards the "Stop" position immediately after switching on. If this cures the trouble, then check to see if stop link (44) is binding against the underside of the baseplate. If so, gently pry away with a screwdriver until perfectly free.

If this fault is only apparent after the mechanism goes into cycle at the end of a record, but not if a record is rejected, it is due to the auto-trip resetting lever (59) not being rotated fully during the change cycle by the action of spring (71) owing to weakening or displacement of the spring or undue stiffness of lever (59) on its pivot.

This fault may also be caused by the lower end of the peg to which spring (25) is attached having been accidentally bent towards the center of the changer. There should be a clearance of about 1/16" between the peg and the edge of the auto-trip resetting lever (59) when the turned up end of the latter is set in contact with the end of the gap in the baseplate through which it protrudes.

PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1		Spindle Assembly	31		12" Record Selector (Used on Model 3RC-532 only)
2		Record Balancing Arm			
3		Pickup Arm	32		Slide Bar
4		Weight Compensating Control	33		Automatic Stop Trip Lever
5		Plug-In Pickup Head	34		Automatic Stop Trip Lever Spring
6		Pickup Arm Hinge Assembly	35		Slide Bar Return Spring
7		Set-Down Adjustment Screws	36		Slide Bar Pivot Link
8		Pickup Arm Hinge Shim	37		Swing Bracket Delay Link
9		Pickup Arm Rest	38		Baseplate
10		Turntable	39		Manual Reject Lever
11		Turntable Bearing & Trip Cam	40		Compression Spring
12		Idler Wheel	41		Pickup Tripping Arm
13		Cycle Drive Wheel	42		Control Return Spring
14		Bearing Washers	43		Spring
15		Bearing (Ball Race)	44		Stop Link
16		Damper Washer	45		Control Knob Shaft & Link Actuating Cam
17		Speed Change Knob			
18		Motor Actuating Lever	46		Pickup Arm Shaft
19		On-Off Switch Actuating Cam	47		Drive Gear for Bakelite Cam
20		Idler Wheel Positioning Link	48		Bakelite Cam
21		Spring	49		Set-Down Position Lever
22		Switch & Idler Wheel Actuating Lever	50		Pinion Gear Swing Bracket
			51		Pinion Gear
23		Shut-Off Link	52		Cycle Release Cam
24		Trip Cam	53		Spring
25		Swing Bracket Locking Lever Spring	54		Speed Control Knob Mounting Shaft
			55		Speed Change Link
26		Swing Bracket Locking Lever	56		Speed Change Pivot Lever
27		Shut-Off Link Spring	57		On-Off Switch
28		Position Control Knob	58		Striker Arm
29		Start-Reject-Stop Control Knob	59		Automatic Trip Resetting Lever
30		Pickup Arm Shaft & Bearing	60		Cam Mounting Axle

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
61		Automatic Trip Resetting Lever Friction Link	78A		Cam Follower
62		Compression Spring	79		12" Selector Wire Lever (Used on Model 3RC-532 only)
63		Pickup Arm Positioning Plate Tension Spring (Used on Model 3RC-532 only)	80		Mounting Bracket for Pickup Arm Actuating Assembly
64		Push Trip Lever	81		Mounting Bracket for Item 79
65		Pickup Arm Positioning Plate	82		Tension Spring
66		Manual Stop Lever	83		Compression Spring
67		Manual Stop Lever Spring	84		Height Adjustment Screw
68		Positioning Plate Indexing Assy.	85		Pickup Arm Lifting Rollers
69		Pickup Arm Positioning Plate Reset Lever (Used on Model 3RC-532 only)	86		Spring Eyelet (Used on Model 3RC-532 only)
70		Slide Bar Connecting Link	87		12" Selector Wire Lever Tension Spring (Used on Model 3RC-532 only)
71		Spring, Automatic Trip Resetting Lever	88		Mounting Bracket for Item 79
72		Shut-Off Lever	89		Spindle Actuating Link
73		Pickup Positioning Arm	89A		Spindle Actuating Lever
74		Pickup Arm Actuating Plate	90		Turntable Hub & Slide Plate Mounting Bracket
74A		Pickup Arm Actuating Lever	91		Slide Plate Return Spring
75		Pickup Arm Shaft Engagement Washer	92		Record Selector Pawl
76		Pickup Arm Actuating Plate Engagement Washer	93		Compression Spring
77		Slide Engagement Stud & Washer	94		Sliding Plate
78		Main Slide	95		Record Selector Pawl Return Spring
			96		Motor & Speed Change Assembly

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DAVID BOGEN MODEL DB20

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DAVID BOGEN
MODEL DB20

LOUDNESS CONTOUR SWITCH

TREBLE CONTROL

ON-OFF SWITCH

INPUT SELECTOR SWITCH

BASS CONTROL

VOLUME CONTROL

DAVID BOGEN
MODEL DB20

TRADE NAME	David Bogen Model DB20
MANUFACTURER	David Bogen Co., Inc., 29 Ninth Ave., New York 14, N.Y.
TYPE SET	AC Operated Five Channel 20 Watt Audio Amplifier
TUBES (Seven)	Types (3) 12AT7 AF Amp., 12AU7 Phase Inv., (2) 6L6G Audio Output, 5U4G Rectifier
POWER SUPPLY	110-120 Volts AC RATING 1.15 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		David Bogen PART No.	STANDARD REPLACEMENT		
V1	Pre Amplifier	12AT7	12AT7	9A	
V2	AF Amplifier	12AT7	12AT7	9A	
V3	AF Amplifier	12AT7	12AT7	9A	
V4	Phase Inverter	12AU7	12AU7	9A	
V5	Audio Output	6L6G	6L6G	7S	
V6	Audio Output	6L6G	6L6G	7S	
V7	Rectifier	5U4G	5U4G	5T	

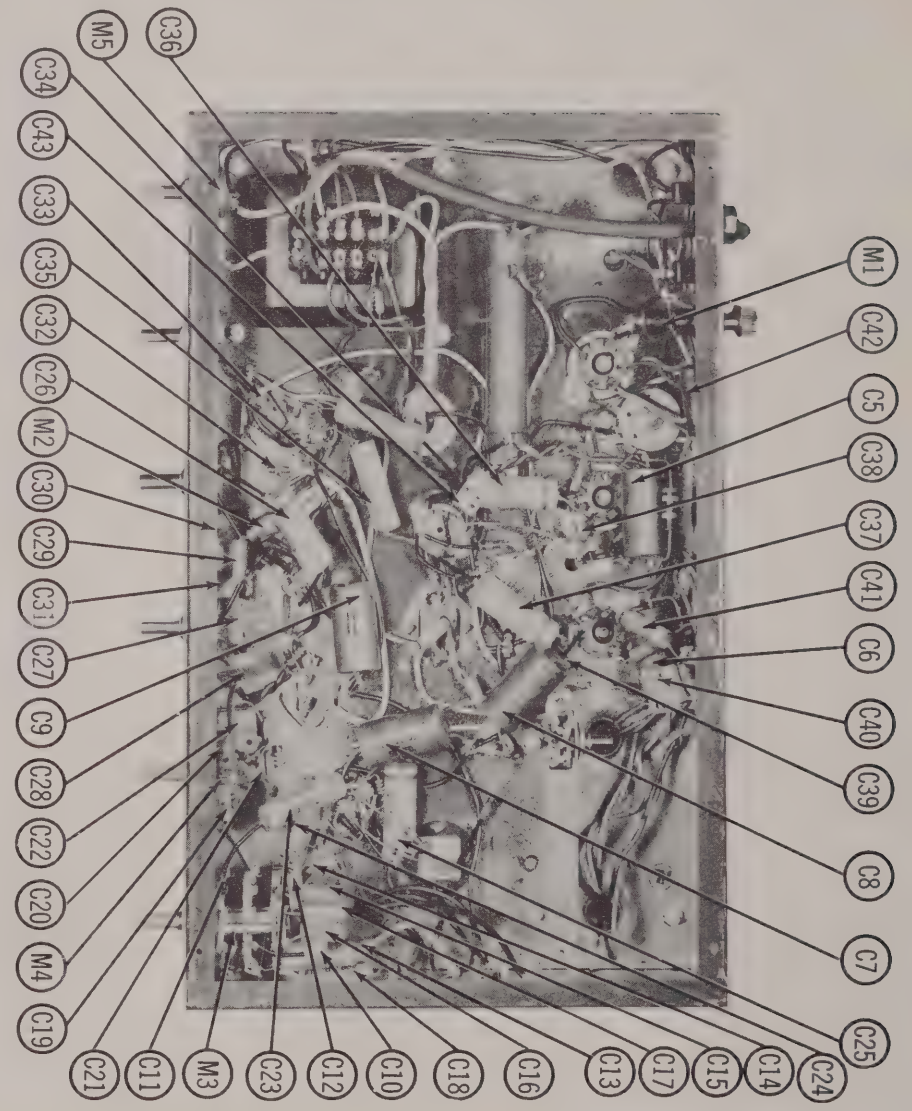
CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	David Bogen PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	8	500				EB10018				Red
B	8	500								Blue
C2A	▲20	450		AFH4-10		B050		FP434	TVL-4760	
B	▲20	450								
C3A	▲20	450		AFH4-10		B050		FP434	TVL-4760	
B	▲20	450								
C4A	▲10	450		AFH4-09		D008		WP433.6		Note 1
B	▲10	450								
C5	50	50		PRS50/50		BR505		TC39	TVA-1308	
C6	50	50		PRS50/50		BR505		TC39	TVA-1308	Note 2
C7	50	50		PRS50/50		BR505		TC39	TVA-1308	
C8	50	50		PRS50/50		BR505		TC39	TVA-1308	Note 3
C9	50	50		PRS50/50		BR505		TC39	TVA-1308	
C10	680	500		1479-0007		2R5T7			MS-37	
C11	3300	500		1464-003		IR5D3		MCB461	MS-23	
C12	1000	500		1464-001		IR5D1		MCB255	MS-21	
C13	.02	600		P688-02		PTE6S2		PT612	6TM-S2	
C14	4700	500		1464-005		IR5D5		MCB465	MS-25	
C15	2200	500		1464-002		IR5D2		MCB457	MS-22	
C16	8200	500								
C17	8200	500								
C18	.006	600		P688-001		PTE6D1		PT621	6TM-D1	Note 4
C19	100	500		1479-0001		2R5T1		MCB235	MS-31	
C20	150	500		1479-00015		2R5T15		MCB236		
C21	8200	500								
C22	4700	500		1464-005		IR5D5		MCB465	MS-25	
C23	.05	400		P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C24	.05	400		P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C25	.1	400		P488-1		PTE4P1		PT401	4TM-P1	
C26	.1	400		P488-1		PTE4P1		PT401	4TM-P1	
C27	2200	500		1464-002		IR5D2		MCB457	MS-22	
C28	3300	500		1464-003		IR5D3		MCB461	MS-23	
C29	150	500		1479-00015		2R5T15		MCB236		
C30	100	500		1479-0001		2R5T1		MCB235	MS-31	
C31	.1	400		P488-1		PTE4P1		PT401	4TM-P1	
C32	10			SII0	D6-100		GP1K-100	UC-541	5GA-Q1	
C33	100			1479-0001		2R5T1		MCB235	MS-31	
C34	.05	400		P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C35	.05	400		P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C36	.1	400		P488-1		PTE4P1		PT401	4TM-P1	
C37	.1	400		P488-1		PTE4P1		PT401	4TM-P1	
C38	47			SI47	D6-470		GP1K-470	UC-5447	5GA-Q47	
C39	47			SI47	D6-470		GP1K-470	UC-5447	5GA-Q47	
C40	1000	500		1464-001		IR5D1		MCB255	MS-21	
C41	.001	600		P688-001		PTE6D1		PT621	6TM-D1	
C42	.047	200		489ZX-05		PJ4S47		PT4147	2TM-S47	
C43	100	500		1479-0001		2R5T1		MCB235	MS-31	

Note 1. Some Models may use a 20MFD @ 450V in this application.
Note 2. Some Models may use a 100MFD @ 50V in this application.
Note 3. Not used in all Models.
Note 4. Some Models use .0068M FD in this application.

CHASSIS—BOTTOM VIEW (CAPACITORS)



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	David Bogen PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1 Meg	½	V315B	Q11-137	AG-61-S	B-69	U-54	Bass
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
R2A	500K	½	V116B	Q13-133X	AT-90	BT-67	UT-430	Treble tapped at 150K
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	500KΩ	½	V322	Q13-133	AG-60-Z	B-60	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A
R4	400Ω	2	V113				C400P	Hum wire wound
R5A	500K	½	V-202-C	Q13-133	AG-60-Z	B-60	U-48	Bias control
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R5A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	David Bogen PART No.	IRC PART No.	
R6	47KΩ	½		BTS-47K	
R7	100KΩ	½		BTS-100K	
R8	1500Ω	½		BTS-1500	
R9	100KΩ	½		BTS-100K	
R10	470KΩ	½		BTS-470K	
R11	1000Ω	½		BTS-1000	
R12	100KΩ	½		BTS-100K	
R13	68KΩ	½		BTS-68K	
R14	47KΩ	½		BTS-47K	
R15	680KΩ	½		BTS-680K	
R16	10KΩ	½		BTS-10K	
R17	270KΩ	½		BTS-270K	
R18	100KΩ	½		BTS-100K	
R19	200KΩ	½		BTS-200K	
R20	68KΩ	½		BTS-68K	
R21	15KΩ	½		BTS-15K	
R22	270KΩ	½		BTS-270K	
R23	47KΩ	½		BTS-47K	
R24	820Ω	½		BTS-820	
R25	47KΩ	½		BTS-47K	
R26	68KΩ	½		BTS-68K	
R27	68KΩ	½		BTS-68KΩ	
R28	470KΩ	½		BTS-470K	
R29	1000Ω	½		BTS-1000	
R30	100KΩ	½		BTS-100K	
R31	68KΩ	½		BTS-68K	
R32	2200Ω	½		BTS-2200	
R33	100KΩ	½		BTS-100K	
R34	100KΩ	½		BTS-100K	
R35	3300Ω	½		BTS-3300	Note 1

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	David Bogen PART No.	IRC PART No.	
R36	150KΩ	½		BTS-150K	
R37	68KΩ	½		BTS-68K	
R38	100KΩ	½		BTS-100K	
R39	330KΩ	½		BTS-330K	
R40	68KΩ	½		BTS-68K	
R41	68KΩ	½		BTS-68K	
R42	22KΩ	1		BTA-22K	
R43	15KΩ	1		BTA-15K	
R44	470KΩ	1½		BTS-470K	
R45	1000Ω	½		BTS-1000	
R46	100KΩ	½		BTS-100K	
R47	470KΩ	½		BTS-470K	
R48	1000Ω	½		BTS-1000	
R49	1500Ω	½		BTS-1500	Note 1
R50	100KΩ	½		BTS-100K	
R51	39KΩ	½		BTS-39K	
R52	22KΩ	½		BTS-22K	
R53	22KΩ	½		BTS-22K	
R54	220KΩ	½		BTS-220K	
R55	270Ω	2			
R56	220KΩ	½		BTS-220K	
R57	270Ω	2			
R58	4700Ω	1		BTA-4700	Note 2
R59	560Ω	1		BTA-560	Note 2
R60A	3000Ω	6			
B	20KΩ	6			
R61	470Ω	½		BTS-470	
R62	4.7Ω	½			Note 3
R63	4.7Ω	½			Note 3
R64	150KΩ	½		BTS-150K	

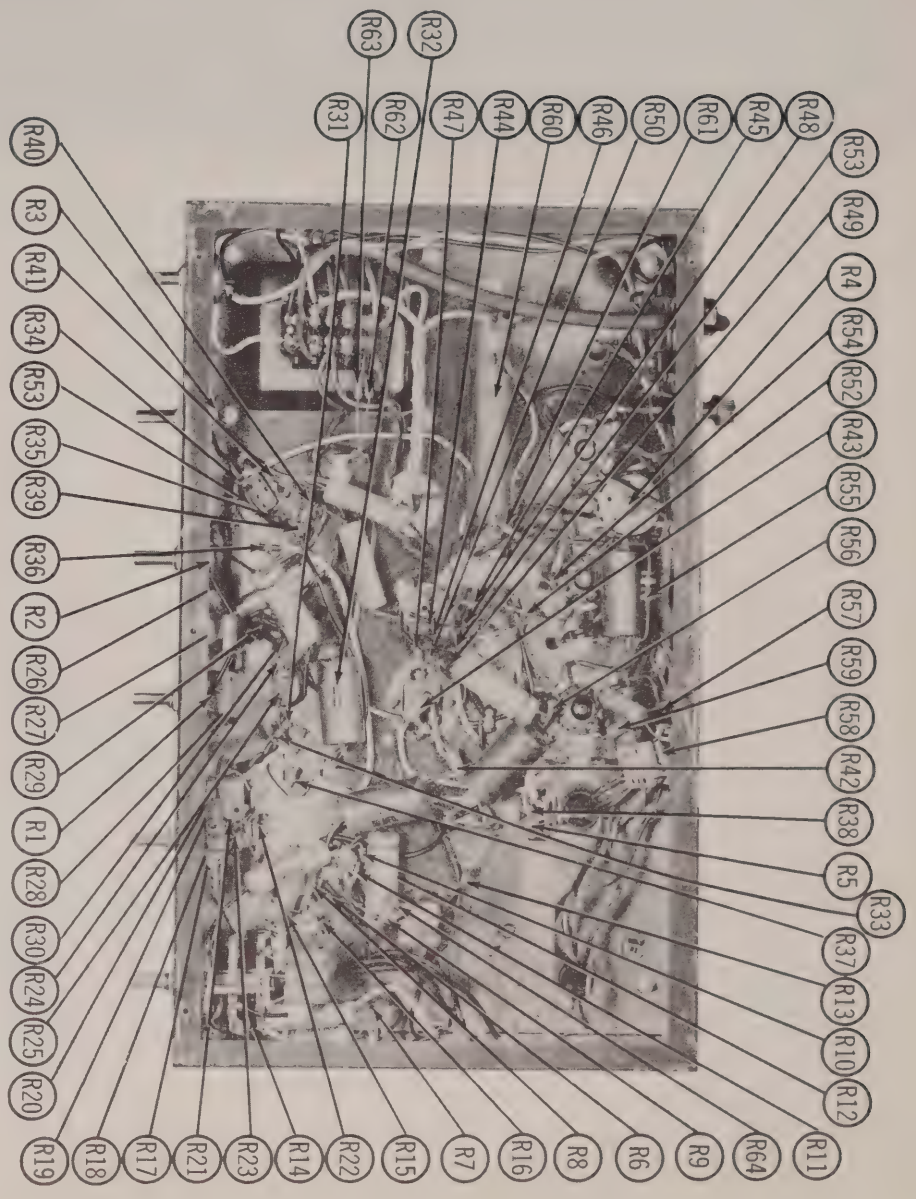
Note 1. Some models may use a 1000Ω resistor in this application.
Note 2. Not used in all models.
Note 3. Some models may use a single 2.2Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	David Bogen PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC 1.15A	760VCT .142ADC	5VAC ② 3A	6.3VAC ② 3A	T-365-1A	P-8162 ①	P-2955	PH-145	P9317	TS-24R07 ①

① Drill new mounting holes.

CHASSIS–BOTTOM VIEW (RESISTORS)



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	David Bogen PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	3.5KΩ	8Ω-16Ω	T295						

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	David Bogen PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L1	.137A	84.5Ω	4HY	T509	C-1411 ①	C-3196 ①	C-15A ①	C5029 ①	T-20C56 ①

① Drill new mounting holes.

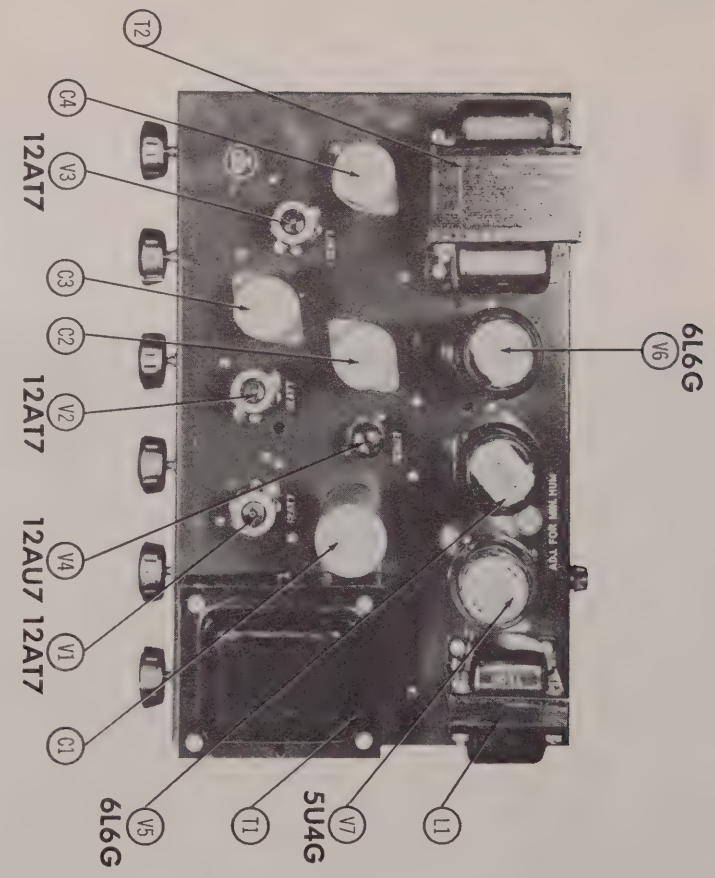
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			David Bogen PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	2A 250V			312002. (3AG-2A)	342001	AGC2	HKP

MISCELLANEOUS

ITEM No.	PART NAME	David Bogen PART No.	NOTES
M2	Dial light		# 47 bayonet
M3	Switch		Input selector rotary wafer
M4	Switch		Loudness contour rotary wafer
M5	Switch		Off-on power rotary foggle

CHASSIS—TOP VIEW



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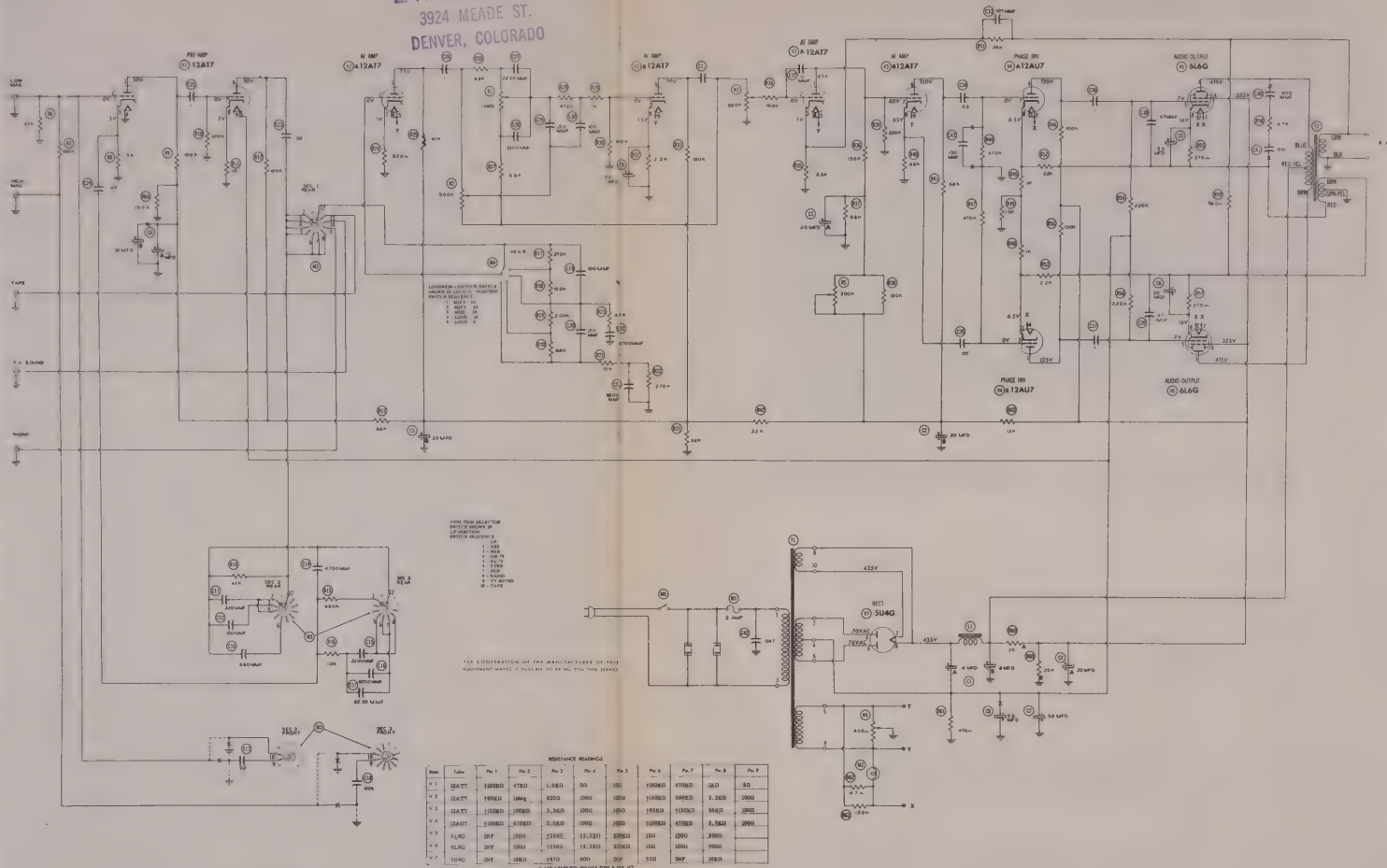

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AT7	†180KΩ	47KΩ	1.9KΩ	0Ω	1Ω	†180KΩ	470KΩ	1KΩ	0Ω
V 2	12AT7	†80KΩ	1MEG	820Ω	100Ω	1ΩΩ	†140KΩ	500KΩ	2.2KΩ	100Ω
V 3	12AT7	†150KΩ	100KΩ	3.3KΩ	100Ω	1ΩΩ	†85KΩ	†150KΩ	68KΩ	100Ω
V 4	12AU7	†100KΩ	470KΩ	3.5KΩ	100Ω	1ΩΩ	†100KΩ	470KΩ	2.5KΩ	100Ω
V 5	6L6G	INF	1ΩΩΩ	215Ω	12.7KΩ	125KΩ	1ΩΩ	1ΩΩΩ	270Ω	
V 6	6L6G	INF	1ΩΩΩ	215Ω	12.7KΩ	125KΩ	1ΩΩ	1ΩΩΩ	270Ω	
V 7	5U4G	INF	18KΩ	187Ω	80Ω	INF	57Ω	INF	18KΩ	

1. DC voltage measurements taken with Hickok tube voltmeter.
2. AC voltages measured at 1000 cycles per sec.
3. Socket measurements are shown as bottom views.
4. Measured values are from socket pin to chassis ground.
5. Resistance values are in ohms unless otherwise designated.
6. Readings measured to ground (0 ohms) unless otherwise indicated.
7. Voltages and resistance readings may vary ± 10% due to variations in tubes and line voltage.
8. All controls set to normal operating positions unless otherwise specified.

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MODEL 21C225

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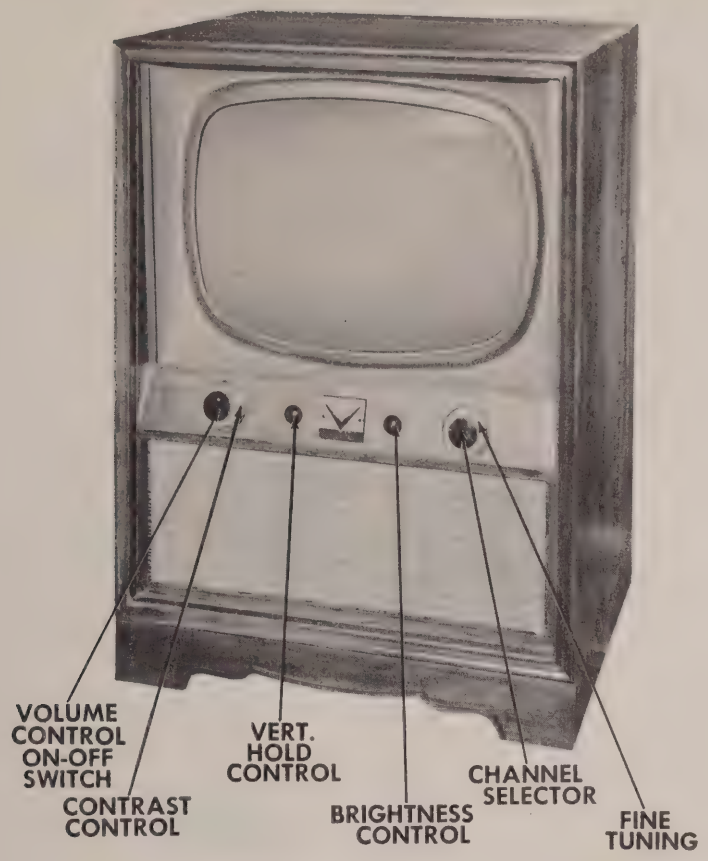

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GENERAL ELECTRIC MODEL 21C225

TRADE NAME	General Electric Models 21C225, 21C226, 21C227, 21C228, 21C229, 21C230, 21C231, 21C232, 21C233, 21T20, 21T21
MANUFACTURER	General Electric Co., Electronics Dept., Electronic Park, Syracuse, N.Y.
TYPE SET	Television Receiver
TUBES	Twenty-five
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 2.35 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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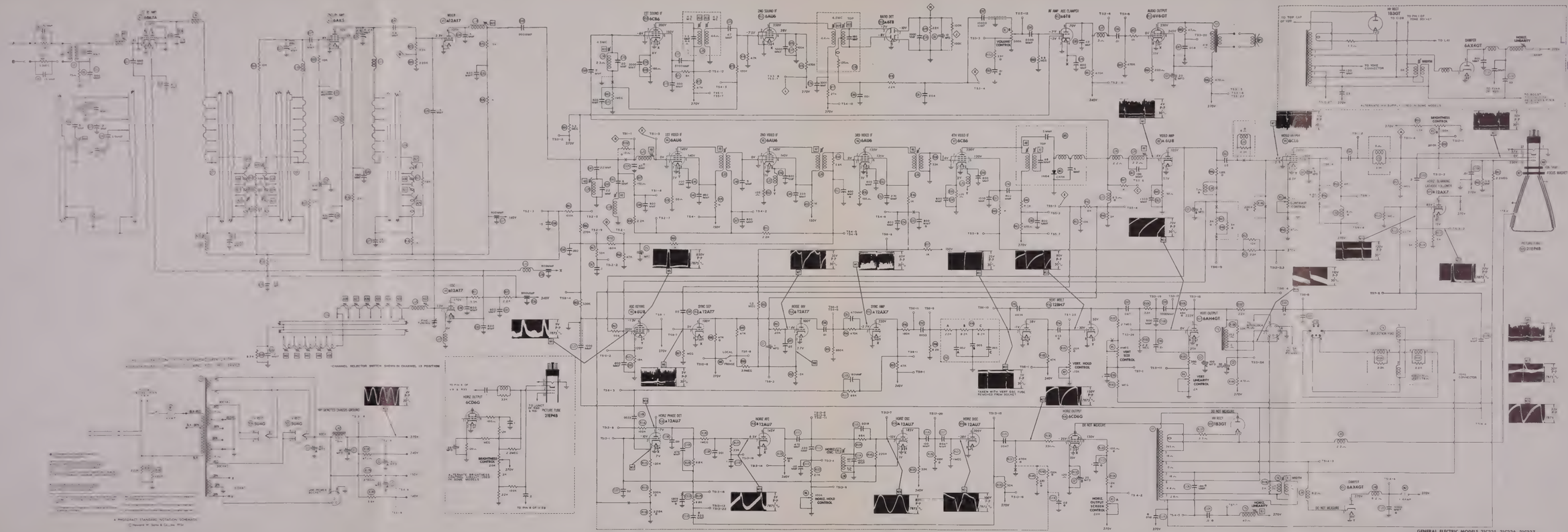

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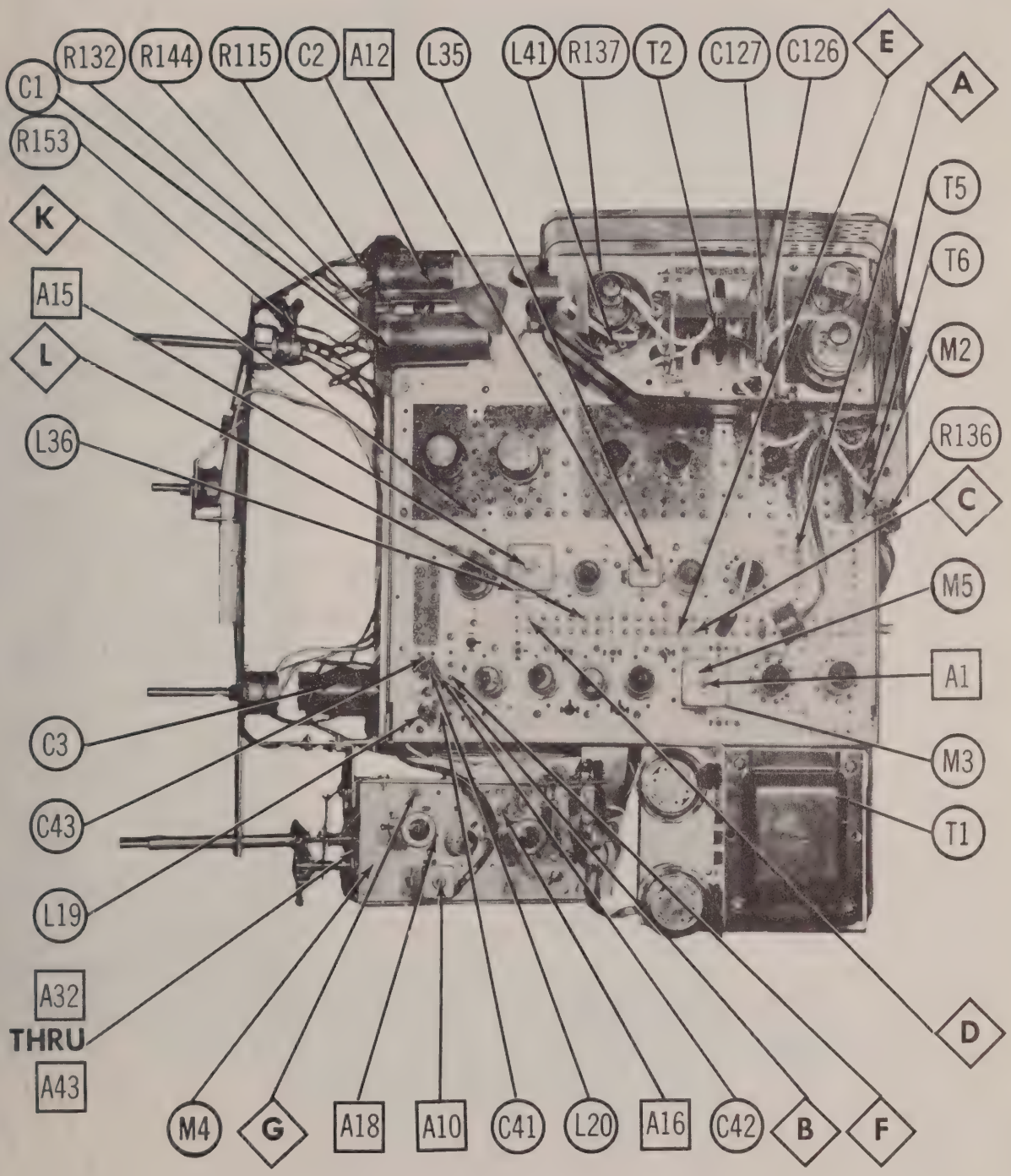

CHASSIS TOP VIEW

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CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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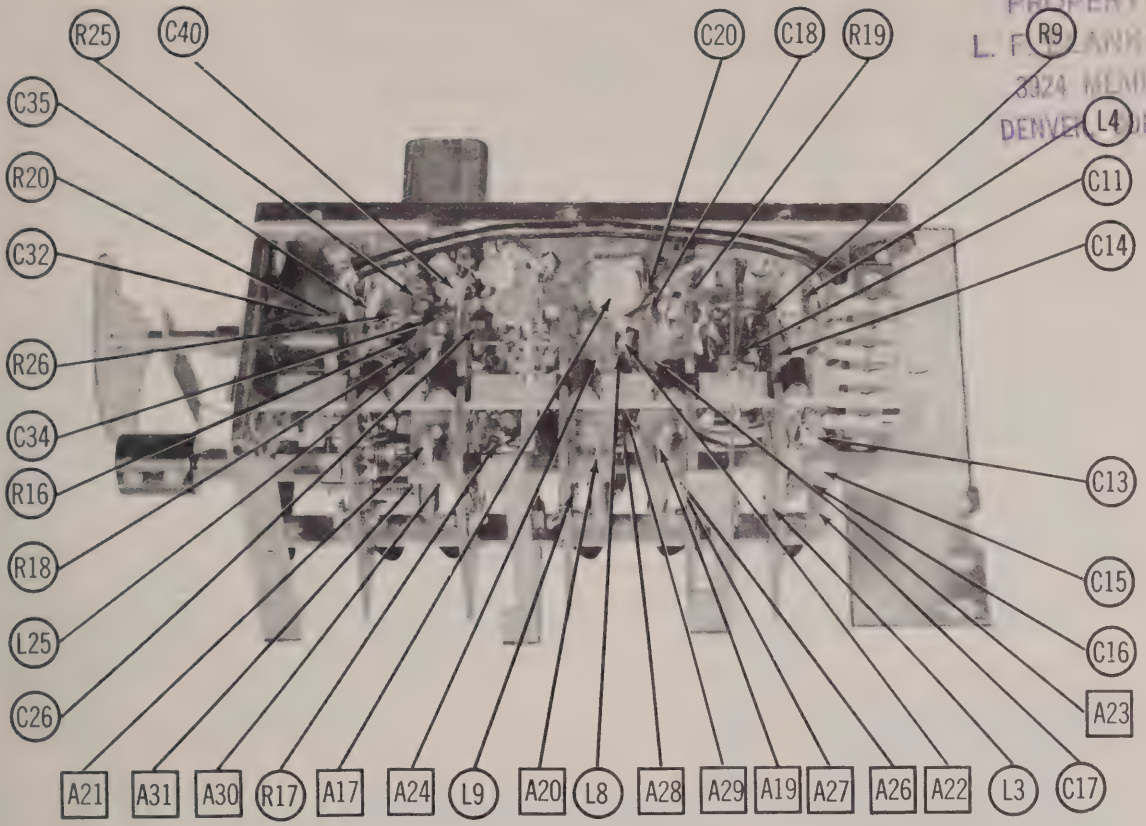
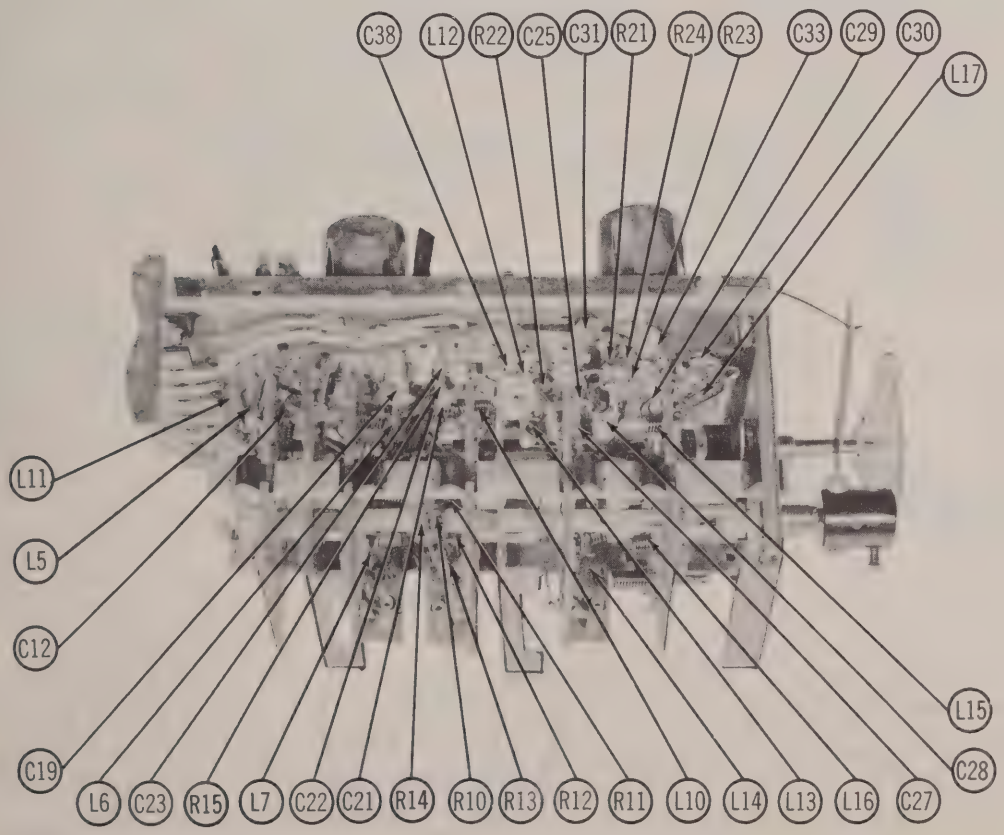


RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the plate cap from the horizontal output tube (V20) and temporarily connecting a 2500Ω, 25 watt resistor across C123 (B+ to chassis). Allow 20 minute warm-up period for receiver and test equipment.

TRAP ALIGNMENT

Set the following controls fully counter clockwise: (a) volume control (b) Brightness control (c) Fine tuning control
Set the contrast control for maximum contrast.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to point (B). Low side to chassis.	Not used	41.25MC (400%Mod)	11	Vert. Amp. to point (A). Low side to chassis.	A1	Remove V14 from its socket. Adjust for MINIMUM 400% indication on scope. If necessary, set scope gain to maximum.
2.	"	"	"	47.25MC	"	"	A2	"
3.	"	"	"	38.0MC	"	"	A3	Remove V14 from its socket. Adjust for MINIMUM 400% indication on scope. If necessary, set scope gain to maximum. If necessary, detune A9 2 or 3 turns into coil to obtain sufficient null indication on scope.
4.	"	High side to point (C). Low side to chassis.	"	4.5MC (400%Mod)	"	Vert. Amp. thru detector (Fig.1) to point (A). Low side to chassis.	A4	Remove fourth video IF amp. (V7) from its socket. Adjust for MINIMUM 400% indication on scope. Replace V7 in its socket.

VIDEO IF ALIGNMENT

Turn contrast control fully counter clockwise.
Connect the negative lead of a 6 volt bias supply to point (D). Connect positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	.001MFD	High side to point (F). Low side to chassis.	44MC (10MC Swp)	42.0MC 42.5MC 45.0MC 45.75MC	11	Vert. Amp. to point (E). Low side to chassis.	A5, A6, A7, A8	Calibrate scope so that 1.75 volts peak to peak produces 2" vertical deflection. Peak A5 thru A8 for maximum response similar to Fig. 2. A5 and A6 affect position of 42.0MC and 45.75MC markers, A7 and A8 affect tilt and dip.
6.	"	High side to point (G). Low side to chassis.	"	41.25MC 42.0MC 42.5MC 45.0MC 45.75MC	"	"	A9, A10	Adjust for response similar to Fig.2. If necessary, retouch A5 thru A10 to obtain desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (H) to chassis. The junction of these two resistors is alignment point (J) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	Direct	High side to point (C). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (L). Common to chassis.	A11, A12, A13	Remove V7 from its socket. Adjust for maximum deflection.
8.	"	"	"	"	DC probe to point (H). Common to chassis.	A14	Adjust for maximum deflection. Retouch A11 thru A14 for maximum deflection.
9.	"	"	"	"	DC probe to point (K). Common to point (J).	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V7 in its socket.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Direct	High side to point (C). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (L). Low side to chassis.	A11, A12, A13	Remove V7 from its socket. Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
8.	"	"	"	"	"	Vert. Amp. to point (H). Low side to chassis.	A14	Disconnect stabilizing capacitor C6. Adjust A11 thru A14 for curve of maximum amplitude and symmetry similar to Fig. 4.
9.	"	"	"	"	"	Vert. Amp. to point (K). Low side to chassis.	A15	Reconnect stabilizing capacitor C6. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 5. SLIGHTLY retouch A14 for maximum amplitude and symmetry of crossover lines. Replace V7 in its socket.

SOUND IF ALIGNMENT USING TV SIGNAL AND VTVM

(If this method is used it should follow step 18).
The set should be restored to normal operating condition by replacing V14 and the plate cap on V20. Remove the bias battery and the 2500Ω resistor across C123.

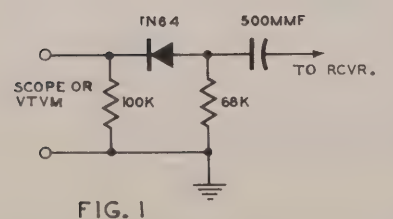


FIG. 1

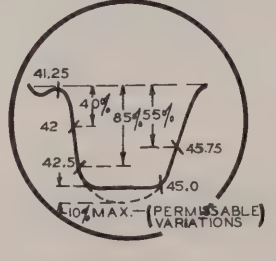


FIG.2

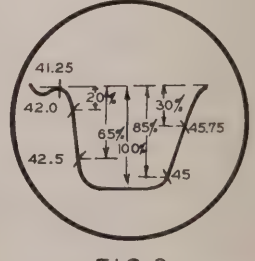


FIG.3

ALIGNMENT INSTRUCTIONS (cont)

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RF AND MIXER ALIGNMENT

Remove the 300Ω transmission line from the input to antenna input coil (L1). Remove B+ from the oscillator. To do this remove the jumper from the center lugs on the tuner terminal strip (just below the tuner top chassis plate). Unsolder the 250 volt lead (red lead from feed thru on top of tuner) and connect it to lug 3 (terminal lug nearest outside edge of tuner). Move the negative lead of the bias supply to the AGC tuner terminal. Connect positive lead to tuner chassis. Adjust for -3 volts at AGC terminal.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Fig. 6	Thru dummy (Fig. 6) across primary of antenna input coil (L1).	213MC (15MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (G). Low side to tuner chassis.	A16, A17 A18, A46	Adjust for response similar to Fig. 7. Adjust A32 on channel 12 for maximum amplitude at center of response only. Check channels 13 thru 7 for proper tracking. If necessary, retouch A18 for best compromise If proper tracking still cannot be obtained redress the second RF plate coil (L13) (Use insulated tool to prevent B+ short) and recheck for proper tracking on channels 13 thru 7. Two settings of A17 are possible. To determine the correct setting switch from channel 13 to channel 12, and note change in bandwidth. The correct setting will be indicated when the bandwidth on channel 12 is slightly greater than bandwidth on channel 13.
			207MC (15MC Swp)	205.25MC 209.75MC	12			
			201MC (15MC Swp)	199.25MC 203.75MC	11			
			195MC (15MC Swp)	193.25MC 197.75MC	10			
			189MC (15MC Swp)	187.25MC 191.75MC	9			
			183MC (15MC Swp)	181.25MC 185.75MC	8			
			177MC (15MC Swp)	175.25MC 179.75MC	7			
11.	"	"	85MC (15MC Swp)	83.25MC 87.75MC	6	"	A19, A20, A21, A22	Adjust for response similar to Fig. 8.
12.	"	"	79MC (15MC swp)	77.25MC 81.75MC	5	"		Check for proper tracking (See Fig. 8). If necessary, repeat step 11.
			69MC (15MC Swp)	67.25MC 71.75MC	4			
13.	"	"	63MC (15MC Swp)	61.25MC 65.75MC	3		A23, A24 A25	Adjust for response similar to Fig. 8.
14.	"	"	57MC (15MC Swp)	55.25MC 59.75MC	2	"	A26, A27 A28, A29 A30, A31	Check for proper tracking (See Fig. 8). Adjust A26 thru A31 by SLIGHTLY expanding coil forms. These adjustments should be made only if proper tracking cannot be obtained after repeating steps 11, 12 and 13. Adjustments of A26 thru A31 are accessible only with the tuner shield removed. Seal adjustments A16 thru A25 with wax to prevent detuning. Restore the B+ lead to the oscillator and replace the jumper to the center lugs on the tuner terminal strip.

OSCILLATOR ALIGNMENT

Leave the bias battery connected as under RF and mixer alignment.
Set the fine tuning knob 1/2 turn from counter clockwise.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15.	Fig. 6	Thru dummy (Fig. 6) across primary of antenna input coil (L1).	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point (E). Low side to chassis.	A32	Adjust so that video marker falls at 50% on response curve as in Fig. 9. Sound marker should fall in trap notch. Reconnect transmission line to antenna input coil (L1).
			207MC (10MC Swp)	205.25MC 209.75MC	12		A33	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A34	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A35	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A36	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A37	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A38	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A39	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A40	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A41	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A42	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A43	

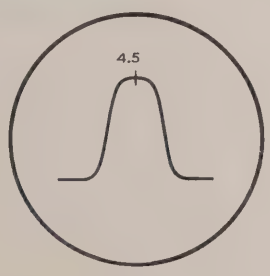


FIG. 4

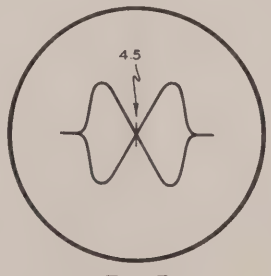


FIG. 5

ALIGNMENT INSTRUCTIONS (cont)

OVERALL RF-IF ALIGNMENT CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Fig. 6	Thru dummy (Fig.6) across antenna terminals.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point (E). Low side to chassis.	A18	Check for response similar to Fig. 9. If necessary, adjust A18 for best response. DO NOT adjust A18 more than three turns in either direction. Usually one turn will produce the desired curve compensation.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
17.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A21	Check for response similar to Fig.9. Of If necessary, retouch A21 for desired curve compensation.
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
18.	"	"	63MC (10MC Swp)	61.25MC 65.75MC	3	"	A25	Check for response similar to Fig. 9. If necessary, retouch A25 for desired curve compensation.
			57MC (10MC Swp)	55.25MC 59.75MC	2			

IF INTERFERENCE TRAP ADJUSTMENT

A44 is preset at the factory at approximately 43.0MC. A44 may be readjusted in the field to eliminate any interfering between the 40-50MC range. When adjusting this trap care should be exercised so that normal channel 2 response is not affected.

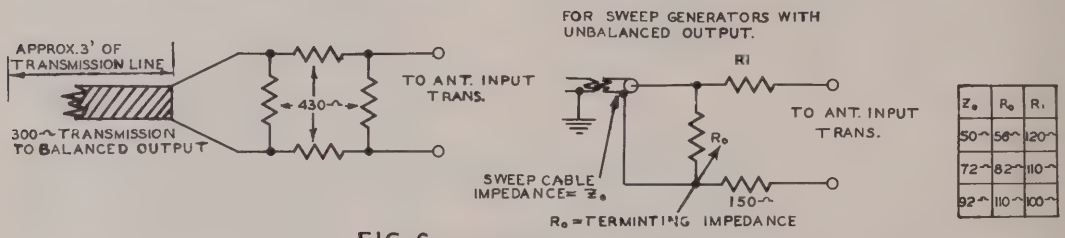


FIG.6

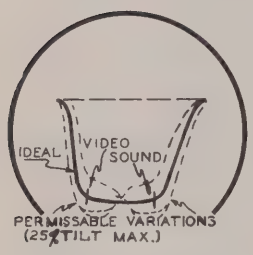


FIG.7

FIG.8

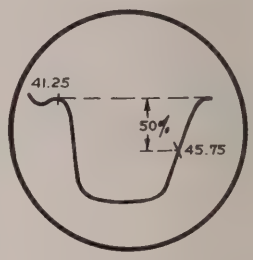
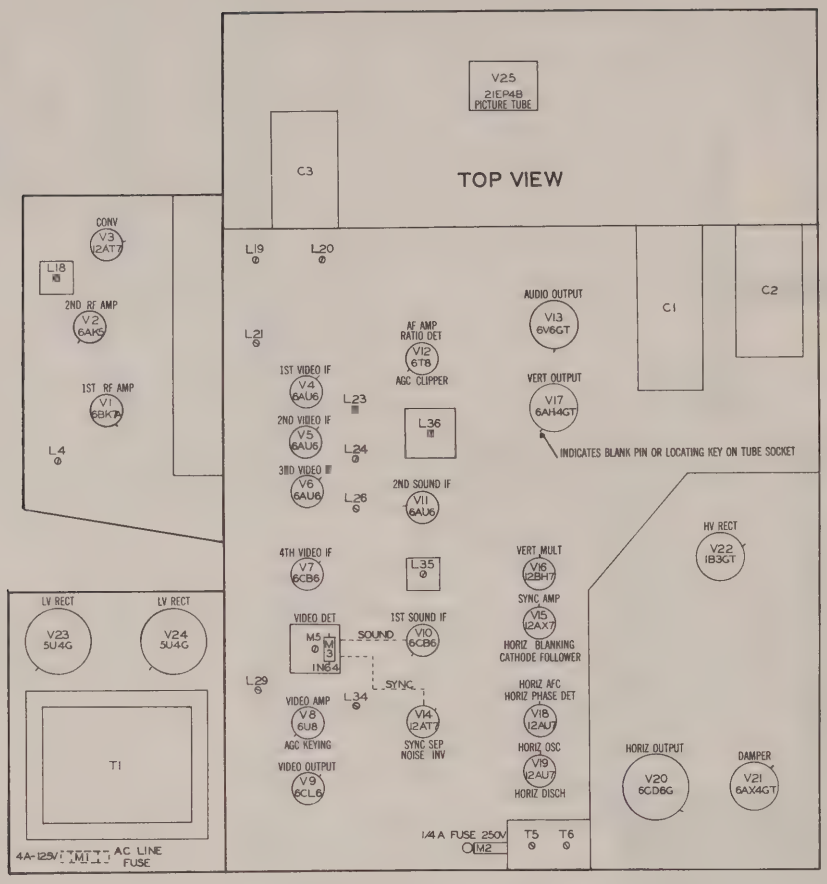


FIG.9

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V23, V24, Fuse (M1)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, V5, V6, V7**
No pic, no sound, has snow - **V1, V2, V3, V4**
No pic, has sound, has raster - **V8, V9, V25**
Has pic, no sound - **V10, V11, V13**
Overloaded picture - **V8, V12**

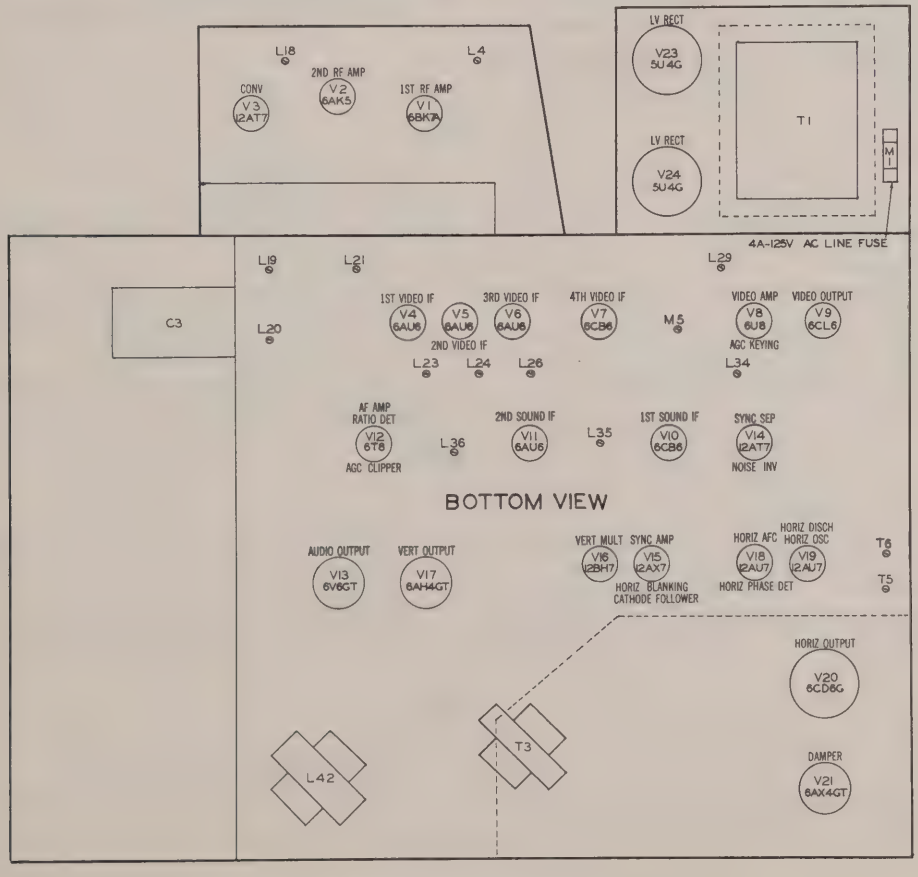
SYNC FAILURE
No vert. sync - **V15, V16**
No horiz. sync - **V15, V18, V19**
No vert. or horiz. sync - **V14, V15**

SWEEP FAILURE
No raster, has sound - **V19, V20, V21, V22, V25, Fuse (M2)**
No vertical deflection - **V16, V17**
Poor vert. linearity or foldover - **V16, V17**
Poor horiz. linearity or foldover - **V19, V20, V21**
Narrow picture - **V19, V20, V21, V22, V23, V24**
Vert. off freq. - **V15, V16**
Horiz. off freq. - **V15, V18, V19**

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BK7A	0Ω	0Ω	0Ω	.1Ω	0Ω	† 5.6KΩ	0Ω	75Ω	0Ω
V 2	6AK5	600KΩ	0Ω	0Ω	.1Ω	† 6.6KΩ	† 17.6KΩ	0Ω		
V 3	12AT7	† 6KΩ	8.2KΩ	0Ω	0Ω	0Ω	† 8KΩ	225KΩ	0Ω	.1Ω
V 4	6AU6	53KΩ	0Ω	0Ω	.1Ω	† 4.8KΩ	† 4.8KΩ	100Ω		
V 5	6AU6	50KΩ	0Ω	0Ω	.1Ω	† 4.8KΩ	† 4.8KΩ	100Ω		
V 6	6AU6	48KΩ	0Ω	0Ω	.1Ω	† 5.8KΩ	† 5.8KΩ	100Ω		
V 7	6CB6	.1Ω	220Ω	0Ω	.1Ω	† 8.7KΩ	† 8KΩ	0Ω		
V 8	6U8	† 10KΩ	† 110KΩ	† 70Ω	.1Ω	0Ω	560KΩ	† 18K	150Ω	3KΩ
V 9	6CL6	900Ω	220KΩ	† 6.9KΩ	.1Ω	0Ω	† 4KΩ	0Ω	† 6.9KΩ	220KΩ
V 10	6CB6	150KΩ	180Ω	0Ω	.1Ω	† 4.7KΩ	† 23KΩ	0Ω		
V 11	6AU6	47KΩ	0Ω	0Ω	.1Ω	† 27KΩ	† 100KΩ	0Ω		
V 12	6T8	INF	22KΩ	INF	.1Ω	0Ω	500KΩ	0Ω	6.8Meg	† 470KΩ
V 13	6V6GT	0Ω	0Ω	† 1KΩ	† 540Ω	470KΩ	INF	.1Ω	220Ω	
V 14	12AT7	† 47KΩ	123KΩ	15KΩ	0Ω	0Ω	† 47KΩ	1 Meg	0Ω	.1Ω
V 15	12AX7	† 47KΩ	1.1Meg	0Ω	0Ω	0Ω	† 70Ω	1 Meg	15KΩ	.1Ω
V 16	12BH7	† 47KΩ	47KΩ	0Ω	.1Ω	.1Ω	▲ 5 Meg	250KΩ	0Ω	0Ω
V 17	6AH4GT	2.2Meg	0Ω	INF	† 22KΩ	† 33KΩ	1.1KΩ	.1Ω	1.1KΩ	
V 18	12AU7	450KΩ	200KΩ	340KΩ	.1Ω	.1Ω	† 68KΩ	1.4Meg	0Ω	0Ω
V 19	12AU7	† 33KΩ	65KΩ	50Ω	0Ω	0Ω	† 30KΩ	1 Meg	0Ω	.1Ω
V 20	6CD6G	0Ω	.1Ω	120Ω	470KΩ	470KΩ	† 16KΩ	0Ω	† 16KΩ	TOP CAP ▲ 24Ω
V 21	6AX4GT	INF	INF	6 Meg	INF	† 88Ω	INF	.1Ω	0Ω	
V 22	1B3GT	PINS 1-8 HAVE INF. RESISTANCE								TOP CAP ▲ 390Ω
V 23	5U4G	INF	20KΩ	INF	16Ω	INF	16Ω	INF	20KΩ	
V 24	5U4G	INF	20KΩ	INF	15Ω	INF	15Ω	INF	20KΩ	
V 25	21EP4B	0Ω	1 Meg	PIN 10 ▲ 2.2Meg	PIN 11 230KΩ	PIN 12 .1Ω				

† MEASURED FROM PIN 8 OF V23.
▲ MEASURED FROM PIN 3 OF V21.



TUBE PLACEMENT CHART

SET 237 FOLDER 7

PREPARED BY
L. P. ELECTRONICS
2000 MAGNOLIA ST
DENVER, COLORADO

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss Of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V19, V20, V21, V23 and V24. Check adjustments B2 and B3. Check waveform W22.

If Satisfactory	If Unsatisfactory
Check C122, C124, C125, R134, R136, R3A, T2, T4A and other associated circuit components.	Check C116, C117, C121, R127, R135, R131 and other associated circuit components.

DRIVE LINES

Check by substitution V19, V20 and V21. Check C116, C117, C121, C124, C125, R127, R131, T2, T4A and other associated circuit components.

COMPRESSED LEFT SIDE

Check by substitution V19, V20 and V21. Check components associated with the horizontal output and damper stages especially T2 and T4A.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V19, V20 and V21. Check T2, T4A, T5, T6 and other associated circuit components.

XMAS TREE EFFECT

Substitute V18 and V19. Check L38, C114, C115 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V16 and V17. Check waveform W13.

If Satisfactory	If Unsatisfactory
Check R144, T3, T4A and other associated circuit components.	Check R103, C97 and other associated components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss Of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V16 and V17. Check T3, T4B, C3C and other associated circuit components.

COMPRESSED AT TOP

Check by substitution V16 and V17. Check C97, R103 and other associated circuit components.

FOLDS

Check by substitution V16 and V17. Check associated circuit components for failure or change of value.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V14 and V15. Check associated components especially C90 and C88.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Check by substitution V14, V15 and V16. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check components associated with V16 especially C94 and C95.	Check vertical integrator network and other associated components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V18 and V19. Check associated components for failure or change of value.

HORIZONTAL BENDING

Check by substitution V18, V19 and V20. Check C109, C110 and other associated circuit components. Check W17 for low frequency modulation.

VIDEO

LOSS OF VIDEO

Check by substitution V8 and V9. Check picture tube and components associated with V8A and V9.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best picture and sound. Check adjustment A4. Check video IF alignment.

POOR CONTRAST

Check by substitution V8 and V9. Check video detector assembly. Check contrast control, picture tube and other associated components.

NEGATIVE PICTURE

Check by substitution V8 and V9. Check AGC network, picture tube and other associated components. Check video detector assembly.

SMEAR

Check by substitution V8 and V9. Check video detector crystal and assembly. Check C63, C64, R46, R146, R55, R57, L33, picture tube and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check V1, V2, V3, V4, V5, V6, V7, V8 and V9 for heater to cathode leakage. Check B+ filter capacitors for open.

AUDIO

WEAK OR NO SOUND

Check by substitution V10, V11, V12 and V13. Check stages V12B and V13 using audio signal generator. Apply audio signal across R80.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V12B and V13 especially C86 and T7.

BUZZ

Adjust tuner fine tuning for best picture and sound. Adjust A15 for minimum buzz. If still unsatisfactory, substitute V12 and realign audio IF and ratio detector stages.

DISTORTED

Follow procedure outlined under "Weak Or No Sound".

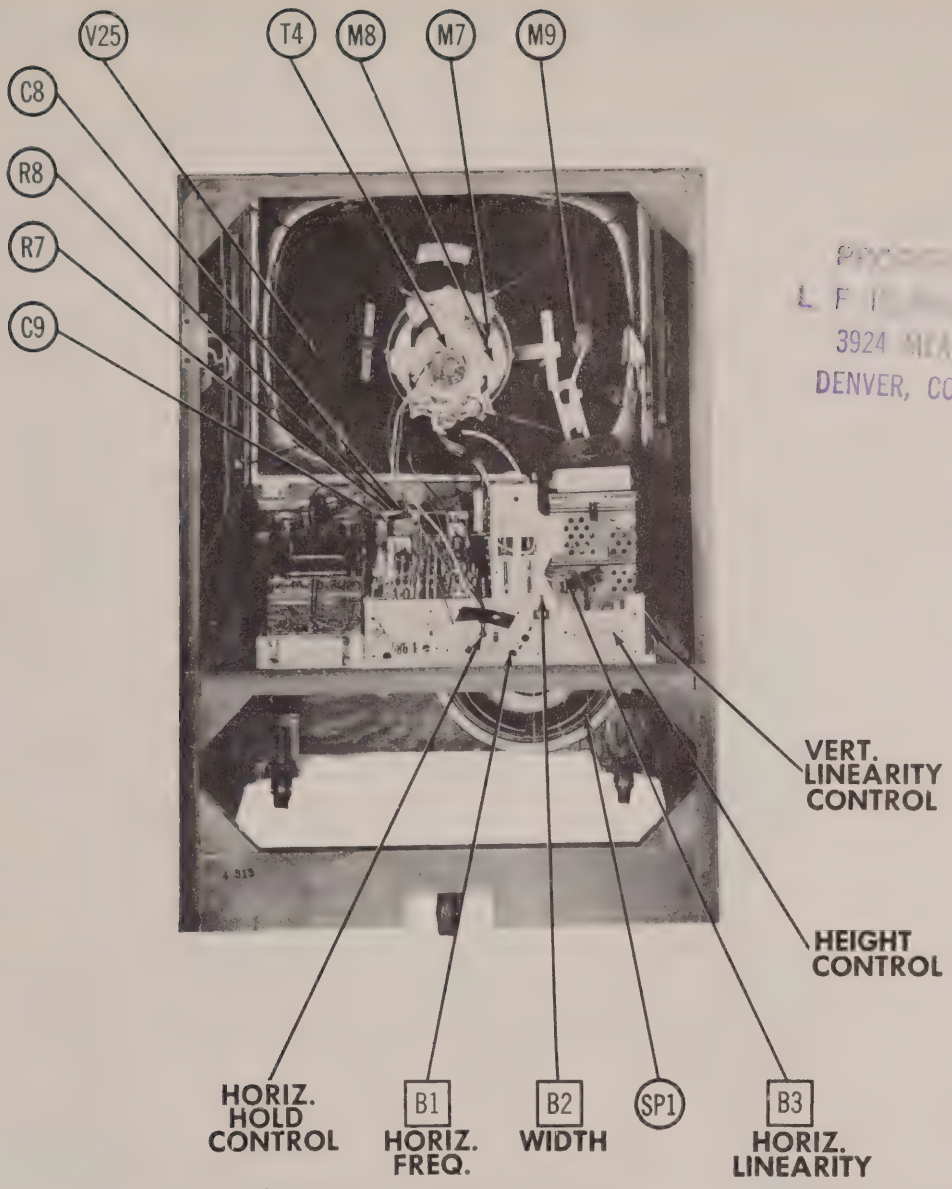
POWER

DEAD SET

If filaments fail to light, check fuse M1, switch on volume control, AC interlock assembly, yoke plug jumper and T1. If filaments light, substitute V23 and V24. Check B+ filter and decoupling network components.

SMALL AND/OR DIM PICTURE

Substitute V23 and V24. Check B+ filter and decoupling network components.



CABINET—REAR VIEW

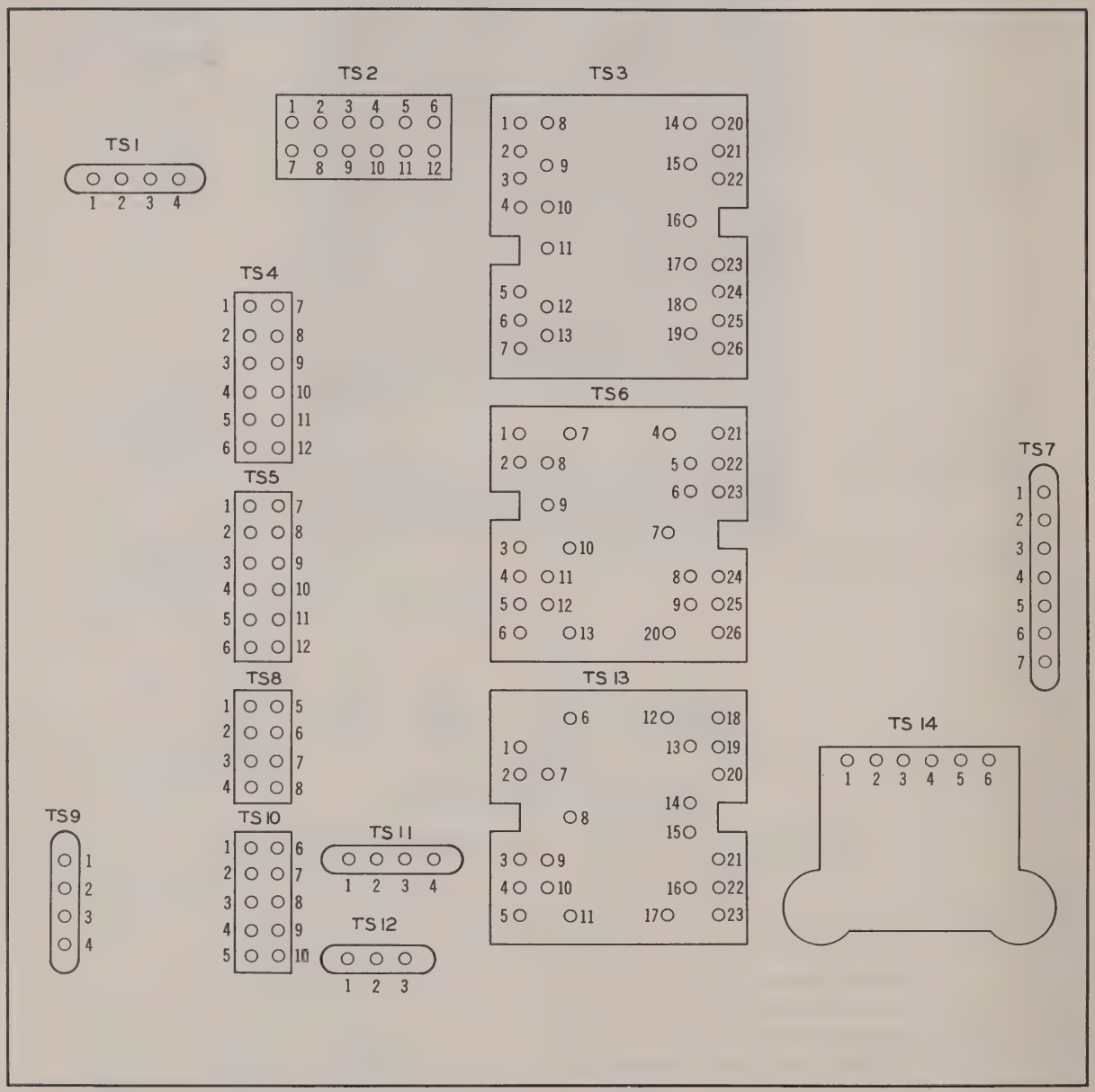
PROPERTY OF
L F [illegible]
3924 MEADE ST.
DENVER, COLORADO

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station preferably a test pattern.

Adjust the horizontal oscillator slug (B1) so that the picture remains in sync over the entire range of the horizontal hold control. The pull-in ability should be the same at both extremes of the horizontal hold control. The pull-in action at extreme settings of the horizontal hold control may be checked by momentarily switching off channel and back again and noting the pull-in action at either extreme of the control.

Simultaneously adjust the horizontal width slug (B2) and the horizontal linearity slug (B3) for a picture that is symmetrical from left to right and slightly wider than necessary to fill the picture mask horizontally.



TERMINAL LOCATION CHART

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		General Electric PART No.	STANDARD REPLACEMENT		
V1	1st RF Amplifier	6BK7A	6BK7A	9AJ	
V2	2nd RF Amplifier	6AK5	6AK5	9BQ	
V3	Converter	12AT7	12AT7	9A	
V4	1st Video IF Amp.	6AU6	6AU6	7BK	
V5	2nd Video IF Amp.	6AU6	6AU6	7BK	
V6	3rd Video IF Amp.	6AU6	6AU6	7BK	
V7	4th Video IF Amp.	6CB6	6CB6	7CM	
V8	Video Amplifier – AGC Keying	6U8	6U8	9AE	
V9	Video Output	6CL6	6CL6	6CL6	
V10	Sound IF Amp.	6CB6	6CB6	7CM	
V11	2nd. Sound IF	6AU6	6AU6	7BK	
V12	Ratio Detector – AF Amplifier AGC Clamper	6T8	6T8	9E	
V13	Audio Output	6V6GT	6V6GT	7S	
V14	Sync Separator – Noise Inverter	12AT7	12AT7	9A	
V15	Sync Amplifier – Horiz. Blanking – Cathode Follower	12AX7	12AX7	9A	
V16	Vert. Mult	12BH7	12BH7	9A	
V17	Vert. Output	6AH4GT	6AH4GT	8EL	
V18	Horiz. Phase Det. – Horiz. AFC	12AU7	12AU7	9A	
V19	Horiz. Oscillator – Horiz. Discharge	12AU7	12AU7	9A	
V20	Horiz. Output	6CD6G	6CD6G	5BT	
V21	Damper	6AX4GT	6AX4GT	4CG	
V22	HV Rectifier	1B3GT	1B3GT	3C	
V23	LV Rectifier	5U4G	5U4G	5T	
V24	LV Rectifier	5U4G	5U4G	5T	

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3924 MEADE ST.
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA				RETMA BASE TYPE	NOTES
	General Electric PART No.	SYLVANIA PART No.	GENERAL ELECTRIC PART No.	WESTINGHOUSE PART No.		
V25	21EP4B	21EP4B 21EP4A 21EP4① 21FP4① 21FP4A ① 21FP4C ①	21EP4B	21EP4B	12N 12N 12N 12D 12M 12L	① Circuit changes necessary.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	General Electric PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲40	350	RCE-154	AFH3-46		C037		FP378	TVL-2637	
B	■90	350								
C2A	▲40	350				D061		FP343.6	TVL-4621	
B	▲5	350		AFH4-51				TC26		
C	■20	350								
D	25	25								
C3A	■20	350	RCE-155			B043		FP385	TVL-3629	
B	▲30	350				BR10015		TC62		
C	▲100	75								
C4	5	350		PRS350/4		BR435		TC60	TVA-1601	Note 1
C5	1	50	RCE-090	PRS150/4		BBR1-50T		TC31	TVA-1300	
C6	10	50		PRS50/10		BR105		TC32	TVA-1304	
C7	1	50	RCE-090	PRS150/4		BBR1-50T		TC31	TVA-1300	
C8	150	500	UCU-532	1468-00015		5W5T15	GP2K-151	MC236	1FM-315	
C9	150	500	UCU-532	1468-00015		5W5T15	GP2K-151	MC236	1FM-315	
C10	1		RCN-001							
C11	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C12	680		RCW-3045	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C13	5		RCW-3057							
C14	5	500	UCG-1005	1469-000005		22R5V5		MCB205	MS-55	
C15	12					Z019				
C16	3.9									
C17	7					Z014				
C18	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C19	1-5		RCY-065							
C20	800		RCW-3076	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C21	1-5		RCY-065							
C22	15		RCW-3076	SI15NP0		Z021	NP0-831-150		5TCC-Q15	
C23	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C24	800		RCW-3095	EF-001	MFT-1000				503C-D1	
C25	.6-2.4		RCY-048							
C26	680		RCW-3045	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C27	680		RCW-3027							
C28	3.9		RCN-055							
C29	1.5		RCW-3046							
C30	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C31	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C32	12		RCW-3074							
C33	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C34	5	500	UCG-1005	1469-000005		22R5V5		MCB205	MS-55	
C35	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C36	800		RCW-3095	EF-001	MFT-1000				503C-D1	
C37	800		RCW-3095	EF-001	MFT-1000				503C-D1	
C38	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C39	800		RCW-3095	EF-001	MFT-1000				503C-D1	
C40	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C41	8	500	RCN-077							
C42	22	500	UCG-2012			22R5Q22				
C43	22	500	UCG-2012			22R5Q22				
C44	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	

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3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA General Electric PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C45	680		RCW-3051	SH680	D6-681	TP60	GP2K-681	UC-5368	5GA-T68	
C46	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C47	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C48	5	500	UCC-1005	1469-000005		32R5Y5		MCB205	MS-55	
C49	300		RCW-3033	SI330	D6-331	TP43	GP2K-331	UC-5333	5GA-T33	
C50	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C51	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	Note 2
C52	270		RCW-3093	SI270	D6-271	TP41	GP2K-271	UC-5327	5GA-T27	
C53	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C54	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C55	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	Note 2
C56	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C57	1000			SU000	D6-102	TP63	GP2L-103	UC-521	5HK-D1	
C58	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C59	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C60	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C61	100	500	UCD-1028	1469-0001		32R5T1		MCB235	MS-31	
C62	1500		RCW-3053						5GA-D13	
C63	.05	600	RCC-103	P688-05	DF-502	CUB6S5		PT615	6TM-S5	
C64	.1	600	RCC-104	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C65	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C66	.002	200	UCC-026	P688-002	D6-202	CUB6D2	GP2-333-202	PT632	6TM-D2	
C67	.1	200	RCC-103	P688-1	DF-104	CUB2P1		PT401	2TM-P1	
C68	.15	200	UCC-049	P388-15		CUB2P15		PT4015	2TM-P15	
C69	5	500	UCG-1005	1469-0000005		32R5V5		MCB205	MS-55	
C70	20	500	UCG-1010	1469-00020		32R5Q2			MS-31	
C71	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	Note 2
C72	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C73	1000			SU000	D6-102	TP63	GP2L-102	UC-521	5HK-D1	
C74	5000		RCW-3014	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C75	47	500	UCJ-520	1468-00005	D6-470	5W5Q47	GP1K-470	MC225	1FM-45	
C76	5000		RCW-3014	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C77	5000		RCW-3014	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C78	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	Note 2
C79	5000		RCW-3014	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C80	.001	400	RCN-071	P686-001	D6-102	CUB6D1	GP2L-102	PT621	6TM-D1	
C81	.004	200		P688-004	D6-402	CUB6D4	GP2-333-402	PT634	6TM-D4	
C82	.05		RCW-3054	BPD-05	DD-503	K082	811-01	DC-511	5HK-S1	
C83	.01	200	UCC-040	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	Note 3
C84	5000		RCW-3014	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C85	43	500	UCJ-1019			32R5Q43				
C86	.01	600		P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C87	.008	1000	UCC-061	P1688-008		CUB1SD8		PT1SD8	MB-D8	
C88	.05	400	RCC-105	P688-05	DF-502	CUB4S5		PT415	4TM-S5	
C89	.05	200	RCC-105	P288-05	DF-503	CUB4S5		PT415	2TM-S5	
C90	.01	600	RCN-063	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C91	.01	500	UCU-544	1468-0005	DW-503	SW5T1	GP2K-471	MC245	1FM-35	
C92	.0033	600	RCN- 073	P688-0033	D6-332	CUB6D33	GP2-333-332	PT6233	6TM-D33	
C93A	.002							PT622		
B	.005		*REK-001	*PA-110	*PC-100	*15T1M1	*1405-01	PT625	*101C1	
C	.005							PT625		
C94	.033	600								
C95	.0039	600	RCN-036	1464-004		1R5D39		MCB463	MS-34	Note 4
C96	.1	1000	UCC-068	P1088-1		CUB1SP1		PT1501	MB-P1	
C97	.047	600	RCN-041							
C98	.01	600	RCN-035							
C99	3900	600	RCW-3106	1464-004		1R5D39		MCB463	MS-34	
C100	800		RCW-3037	BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C101	.001	1000		P1088-01	DD16-103	CUB1S51		PT1501	MB-S1	
C102	.01	600	UCC-040	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C103	.2	400	UCC-051	P488-22		CUB4P22		PT4022	4TM-P22	
C104	.01	600	RCN-063	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C105	150	600	RCU-307							
C106	.0033	600	RCN-066			1R5D33				
C107	.02	200	UCC-041	P488-02	DF-303	CUB282		PT2412	4TM-S2	
C108	.001	600	RCN-062	1464-001		1R5D1		MCB255	MS-21	
C109	.001	500	RCN-062	1464-001		1R5D1		MCB255	MS-21	
C110	.1	200	UCC-103	P288-1	DF-104	CUB4P1		PT401	2TM-P1	
C111	470	500	UCU-1544	1469-0006		5R5T47		MCB245	MS-35	
C112	220	500	RCU-309			22R5T22				
C113	100	500	UCU-1538	1469-0001		5R5T1		MCB235	MS-31	
C114	1000	500	RCU-314	1464-001		1R5D1		MCB255	MS-21	
C115	.0018	600	RCN-033			1R5D18				
C116	100	500	UCU-1538	1469-0001		5R5T1		MCB235	MS-31	
C117	.0047	600	RCN-051	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C118	820	500	UCU-1550			1R5T82				Note 5
C119	1200	500	UCU-2064			1R5D12				Note 2
C120	470	500	UCU-1544	1469-0006		5R5T47		MCB245	MS-35	
C121	.0047	600	RCN-051	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C122	.1	600	RCC-048	P688-1	DF-104	CUB6P1		PT601	6TM-P1	Note 6
C123	5000		RCW-3014	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	Note 7
C124	.01	600		P688-01		CUB6S1		PT611	6TM-S1	Note 2
C125	.056	600	RCN-064			PM6S56				Note 8
C126	180	3000		HVD30-00018					30GA-T18	Note 9
C127	1000	1500	RCU-312	HVD15-001		ID25D1	1R5KV-102	MCK210	20GA-D1	
C128	470	2000	RCU-311	HVD30-00047		IDP25T5	3KV-471		30GA-T47	
C129	47									Note 2
C130	.05	200	RCC-105							Note 2
C131	.0047	600	RCN-051							Note 2
C132	.03	600	RCC-099							

Note 1. When V9 (Video output) is a 6AQ5, C4 is 800MMF.
Some Models combine C4 with C3. (When C3 is 4-section unit, part no. is RCE-168.
Note 2. Not used in all Models.
Note 3. Used on console models only.
Note 4. Some Models use .047MFD in this application (part #RCN-041).
Note 5. Some Models use 300MMF in this application (part #RCU-308) .
Note 6. Some Models use .056MFD in this application (part #RCC-104).
Note 7. Some Models use 800MMF in this application (part #RCW-3037).
Note 8. Some Models use .03MFD in this application (part #RCC-099).
Note 9. Some Models use 130MMF in this application
* Items C85A, C93B, C93C, R94A, R95B, R99C are combined in one unit.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA General Electric PART No.	IRC PART No	CLAROSTAT PART No	CENTRALAB PART No	MALLORY PART No	INSTALLATION NOTES
R1A	3000Ω	2	RHC-215	* QJ-524	RTV-448			Contrast-Panel
B	500KΩ	½	Not Req.					Volume and switch tapped at 300K - Rear
R2A	175KΩ	½	RHC-215	QH-129	AG-52-8	AB-46	U-43	Vert. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-9	Not Req.	Attach to R2A
R3A	20KΩ	½	RHC-213	QH-119			UF252L	Horiz. Output Screen Control
B	100KΩ	½	Not Req.	MH-128			UR65L	Brightness
C	Shaft		Not Req.	Not Req.			DS-36	Attach to R3A
R4A	2000Ω	2	RHC-208	WK-2000	A43-2000	VK-131	R2500L	Vert. Linearity wire wound
B	Shaft		Not Req.	Not Req.	FK8-1/4	Not Req.	Not Req.	Attach to R4A
R5A	4 Meg	½	RHC-209	QH-141	AG-85-8	AB-86	SU-67	Vert. Size
B	Shaft		Not Req.	8Q	FK8-1/4	AK-1	Not Req.	Attach to R5A
R6A	100KΩ	½	RHC-207	QH-128	AG-49-8	AB-40	SU-41	Horiz. Hold
B	Shaft		Not Req.	8Q	FK8-1/4	AK-1	Not Req.	Attach to R6A

* CONCENTRIKIT EQUIVALENT KIT K-3 BASE ELEMENTS AND SHAFTS W17-112 & P3-214 (Panel)
B10-132X & R3-312 (Rear) 6-SWITCH 78-1.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA General Electric PART No.	IRC PART No.	NOTES
R7	3.3Meg	½	URD-133	BTS-3.3Meg	
R8	3.3Meg	½	URD-133	BTS-3.3Meg	
R9	750 5%			BTS-75 5%	
R10	82Ω	½		BTS-82K	
R11	2200Ω	½	URD-057	BTS-2200	
R12	330Ω	½	URD-037	BTS-330	
R13	330Ω	½	URD-037	BTS-330	
R14	18KΩ	½	URD-079	BTS-18K	
R15	10KΩ	½	URD-073	BTS-10K	
R16	12KΩ	½		BTS-12K	
R17	5600Ω	½		BTS-5600	
R18	1000Ω	½	URD-049	BTS-1000	
R19	3100Ω	½		BTS-3100	
R20	8200Ω	½	URD-071	BTS-8200	
R21	3300Ω	½		BTS-3300	
R22	2200Ω	½	URD-057	BTS-2200	
R23	3300Ω	½		BTS-3300	
R24	220KΩ	½	URD-105	BTS-220K	
R25	1500Ω	½		BTS-1500	
R26	1000Ω	½	URD-049	BTS-1000	
R27	150Ω 5%	½	URD-029	BTS-150 5%	
R28	100Ω	½		BTS-100	
R29	1000Ω	½	URD-049	BTS-1000	
R30	2200Ω	½	URD-057	BTS-2200	
R31	2200Ω	½	URD-057	BTS-2200	
R32	1000 5%	½		BTS-100 5%	
R33	1000Ω	½	URD-049	BTS-1000	
R34	56000 5%	½		BTS-5600 5%	
R35	100Ω 5%	½		BTS-100%	
R36	1000Ω	½	URD-049	BTS-1000	
R37	1000Ω	½	URD-049	BTS-1000	
R38	33KΩ	½	URD-085	BTS-33K	
R39	220Ω	½	URD-105	BTS-220	
R40	82000Ω 5%	2	URF-071	BTB-8200 5%	
R41	470Ω	½	URD-041	BTS-470	
R42	1 Meg	½	URD-121	BTS-1 Meg	Note 1
R43	1000Ω	½	URD-049	BTS-1000	
R44	30000 5%	2		BTS-3000 5%	
R45	150Ω	½	URD-029	BTS-150	
R46	1800Ω	1		BTA-1800	Note 4
R47	3000Ω 5%	2			Note 11
R48	3000Ω 5%	2			Note 11
R49	1000Ω	½	URD-049	BTS-1000	
R50	10KΩ	½	URD-073	BTS-10K	
R51	10KΩ	½	URD-073	BTS-10K	
R52	100Ω	2	URF-073	BTB-100	
R53	22KΩ	½	URE-081	BTA-23K	
R54	47Ω	½	URD-017	BTS-47	Note 1
R55	4000Ω	10	RRW-053		
R56	6800Ω	1		BTA-6800	Note 1
R57	1 Meg	½	URD-121	BTS-1 Meg	
R58	2000KΩ 5%	½	URD-104	BTS-200K 5%	
R59	100KΩ	½	URD-097	BTS-100K	
R60	3.9 Meg	½	URD-135	BTS-3.9Meg	
R61	2.2Meg	½	URD-139	BTS-2.2Meg	
R62	100KΩ	½	URD-097	BTS-100K	
R63	330KΩ	½	URD-109	BTS-330K	
R64	3.3Meg	½	URD-133	BTS-3.3Meg	
R65	100KΩ	½	URD-097	BTS-100K	
R66	270KΩ	½	URD-107	BTS-270K	
R67	33KΩ	½	URD-085	BTS-33K	
R68	47KΩ	½	URD-089	BTS-47K	
R69	1000Ω	½	URD-049	BTS-1000	
R70	180Ω	½	URD-031	BTS-180	
R71	18KΩ	½	URD-079	BTS-18K	
R72	4700Ω	2		BTS-4700	
R73	100KΩ	½	URD-097	BTS-100K	
R74	47KΩ	½	URD-089	BTS-47K	
R75	100KΩ	½	URD-097	BTS-100K	
R76	470KΩ	½	URD-113	BTS-470K	
R77	27KΩ	½	URD-083	BTS-27K	
R78	22KΩ	½	URD-081	BTS-22K	
R79	22KΩ	½	URD-081	BTS-22K	
R80	6.8Meg	½	URD-141	BTS-6.8Meg	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA General Electric PART No.	IRC PART No	NOTES
R81	470KΩ	½	URD-113	BTS-470K	
R82	470KΩ	½	URD-113	BTS-470K	
R83	1000Ω	½	URD-049	BTS-1000	
R84	220Ω	½	URE-033	BTA-220	
R85	47Ω	½		BTS-47	
R86	470Ω	2	URF-041	BTB-470	
R87	1 Meg	½	URD-121	BTS-1 Meg	
R88	47KΩ	½	URE-089	BTA-47K	Note 3
R89	47KΩ	½	URE-089	BTA-47K	
R90	3.9 Meg	½	URD-135	BTS-3.9Meg	
R91	120KΩ	½	URD-099	BTS-120K	
R92	15KΩ	½	URD-077	BTS-15K	
R93	1.2Meg	½	URD-123	BTS-1.2Meg	
R94	470KΩ	½	URD-113	BTS-470K	
R95	680KΩ	½	URD-117	BTS-680K	
R96	180KΩ	½	URD-103	BTS-180K	
R97	47KΩ	½	URD-089	BTS-47K	
R98	8200Ω	½	URD-071	BTS-8200	
R98A	22KΩ			BTS-22K	
B	8200Ω		* REK-001	BTS-8200	
C	68200Ω			BTS-8200	
R100	47KΩ	2	URF-089	BTB-47K	
R101	120KΩ	½	URD-099	BTS-120K	Note 5
R102	2.7Meg	½	URD-131	BTS-2.7Meg	
R103	2.2Meg	½	URD-129	BTS-2.2Meg	
R104	33KΩ	½	URD-085	BTS-33K	
R105	390Ω	½	URF-039	BTB-390	
R106	68KΩ	½	URD-093	BTS-68K	Note 3
R107	22KΩ	½	URD-081	BTS-22K	
R108	33KΩ	½	URD-085	BTA-33K	
R109	2200Ω	½	URD-057	BTS-2200	
R110	2200Ω	½	URD-057	BTS-2200	
R111	1 Meg	½	URD-121	BTS-1 Meg	
R112	220KΩ	½	URD-105	BTS-220K	
R113	15KΩ	½	URD-077	BTS-15K	
R114	15KΩ	½	URD-077	BTS-15K	
R115	120KΩ 5%	½		BTS-120K 5%	
R116	100KΩ	½	URD-097	BTS-100K	
R117	68KΩ	½	URD-093	BTS-68K	
R118	220KΩ	½	URD-105	BTS-220K	Note 6
R119	330KΩ	½	URD-109	BTS-330K	Note 6
R120	1 Meg	½	URD-121	BTS-1 Meg	
R121	33KΩ	½	URD-085	BTS-33K	
R122	68KΩ	½	URD-093	BTS-68K	
R123	27KΩ	½	URD-083	BTS-27K	
R124	68KΩ	½	URD-093	BTS-68K	
R125	33KΩ	½	URE-085	BTA-33K	
R126	68KΩ	½	URD-093	BTS-68K	Note 3
R127	1 Meg	½	URD-121	BTS-1 Meg	
R128	6800Ω	½	URD-069	BTS-6800	
R129	6800Ω	½	URD-069	BTS-6800	
R130	330Ω	½	URD-037	BTS-330	
R131	470KΩ	½	URD-113	BTS-470K	Note 7
R132	120Ω	5	RRW-103	1 3/4A-120	
R133	100Ω 5%	½		BTS-100 5%	Note 8
R134	12KΩ	2		BTB-12K	Note 9
R135	300Ω 5%	½		BTS-300 5%	
R136	5000Ω	10	RRW-106	1 3/4A-5000	
R137	3.3Ω	½	RRW-105		
R138	470Ω	1	URE-041	BTA-470	
R139	3750Ω	20	RRW-104		
R140	5600Ω	5	RRW-079		
R141	2200Ω	2	URF-105	BTB-230K	
R142	220KΩ	2	URF-105	BTB-220K	
R143	1 Meg	½	URD-121	BTS1 Meg	
R144	470Ω	2	URF-041	BTB-470	
R145	220KΩ	½	URD-105	BTS-220K	
R146	220KΩ	½	URD-105	BTS-220K	Note 1
R147	330KΩ	½		BTS-330K	Note 1
R148	150KΩ	½	URD-101	BTS-150K	Note 1
R149	330KΩ	½	URD-109	BTS-330K	Note 1
R150	10Ω	½		BTS-10	Note 1
R151	18KΩ	2		BTB-18K	Note 2
R152	180KΩ	½		BTS-180K	
R153	33KΩ	½		BTS-33K	Note 10

Note 1. Not used in all models.
Note 2. Some models may use a 20KΩ resistor in this application.
Note 3. Some models may use a 100KΩ resistor in this application.
Note 4. Some models may use a 3300Ω resistor in this application.
Note 5. Some models may use a 82KΩ resistor in this application.
Note 6. Some models may use a single 160KΩ resistor in this application.
Note 7. Some models may use a 270KΩ resistor in this application.
Note 8. Some models may use a 1000Ω resistor in this application.
Note 9. Some models may use a 22KΩ resistor in this application.
Note 10. Use in console models only.
* Items R99A, R99B, R99C, C93A, C93B, C93C are combined in one unit.
Note 11. In some production R47 & R48 were replaced by a single resistor R147 while other productions did not use any of these resistors.

TRANSFORMER (POWER)

ITEM No	RATING PRI	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA General Electric PART No.	Stancor PART No	Merit PART No	Triad PART No	RCA TYPE No	Hollidorson PART No	Thardorson PART No
T1	117VAC	570VCT @ 2.35A	5VAC @ 6A	RTP-314						
	SEC. 3	SEC. 4	SEC. 5							
	12.6VCT @ 6.1A									

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA General Electric PART No.	Stancor PART No.	Merit PART No	Triad PART No	RCA TYPE No	Hollidorson PART No
T2	Horiz. Output Trans.	RTO-146-3 RTO-231 ①				232T1①	
T3	Vert. Output Trans.	RTO-136					
T4A	Yoke-Horiz. (12MH) ②	RLD-062					
B	Yoke-Vert. (43MH)						
T5	Horiz. Lin. Coil (6-20MH)	RLD-056	WC-54④	MWC④5	WC-11④	20H3④	
T5A	Width Coils (.2-1.8MH)	RLD-054 ③					
B	Width Coils (1.1-9MH)	RLD-053③					

① Alternate horiz. output trans.
② Horiz. windings are parallel connected.
③ Alternate horiz. lin. coil.
④ Drill new mounting hole or use original slider and core.
⑤ Connect to coded red and blue terminals.
⑥ Alternate width coils.
⑦ Connect terminal #3 to terminal #2, then connect original terminal #3 to new terminal #10, original #5 to new #9 or #8, original #2 to new #6, original #6 to new #5, original #1 to new #2 and #3, original #7 to new #1.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA General Electric PART No.	Stancor PART No	Merit PART No	Triad PART No	Hollidorson PART No	Thardorson PART No	NOTES
T7	8.6KΩ	3.4Ω	RTO-135	A-3877⑦	A-3019	S-5Z	Z1002		① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA General Electric PART No	VIKING PART No	QUAM PART No	NOTES
SP1	12"	PM	3.4Ω	S-1212D	12F11	12A31	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI	DC RES. SEC.	REPLACEMENT DATA General Electric PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Trans.	00CT	0Ω	RLA-037				Includes C10, Part # RCN-001
L3	Ant. Coupling	0Ω		RLI-165				Note 1
L3	Ant. Coil	0Ω						
L4	IF Trap	.1Ω		RLI-159				
L5	IF Trap	0Ω		RLI-191				
L6	1st RF Plate Coil	0Ω						Channel 13
L7	1st RF Plate Coils	0Ω		RSX-032				Includes switch wafer with coils
L8	2nd RF Grid Coil	0Ω						High channel
L9	2nd RF Grid Coils	0Ω		RSX-031				Includes switch wafer with coils
L10	2nd RF Grid Coil	0Ω						Channel 13
L11	Fil. Choke	.1Ω		RLL-142	19-3001	TV-189	6175	L 4 Microhenries
L12	Fil. Choke	.31Ω		RLL-144				.56 Microhenry; IRC Part # CLA
L13	2nd RF Plate Coil	0Ω						Channel 13
L14	2nd RF Plate Coils	0Ω		RSX-030				Includes switch wafer with coils Channel 13
L15	Osc. Coil	0Ω						
L16	Osc. Coils	0Ω		RSX-019				Includes switch wafer with coils L 4 Microhenries
L17	Cathode Choke	.3Ω		RLI-145				
L18	Conv. Plate	.1Ω		RTL-146				
L19	38MC Trap	.4Ω		RLL-213	20-1046			G. E. Part # Includes C41
L20	47.25MC Trap	0Ω		RLL-217	20-1047			G. E. Part # Includes C43&C45
L21	1st Video IF	.1Ω		RLI-192	17-4500 †		6219 *	Includes core; core Part # RE1-038
L22	Fil. Choke	.1Ω		RLL-142	19-3001	TV-189	6175	L 4 Microhenries
L23	2nd Video IF	.1Ω	.1Ω	RTL-144	17-4532		6219	Includes core; core Part # RE1-038
L24	3rd Video IF	.1Ω	.1Ω	RTL-144	17-4533		6219	Includes core; core Part # RE1-038
L25	Fil. Choke	.1Ω		RLL-142	19-3001	TV-189	6175	L 4 Microhenries
L26	4th Video IF	.1Ω	.1Ω	RTL-146	17-4533		6219	
L27	Shunt Peak. Coil	6.5Ω			19-3250	TV-185	6154	220 Microhenries; Note 2
L28	Series Peak. Coil	2.3Ω		RLL-195	19-3036	TV-190	6176	31 Microhenries
L29	4.5MC Trap	.7Ω		RLL-303	20-1004	TV-191	1470	G. E. Part # Includes C61
L30	Shunt Peak. Coil	7Ω		RLL-197	19-3250	TV-185	6154	220 Microhenries; Note 3

PROPERTY OF L. F. BLANKENSHIP 3924 MEADE ST. DENVER, COLORADO

GENERAL ELECTRIC MODELS 21C225, 21C226, 21C227, 21C228, 21C229, 21C230, 21C231, 21C232, 21C233, 21T20, 21T21

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	General Electric PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L31	Series Peak. Coil			RLI-212	19-3125 ♦	TV-182	6153 ♦	120 Microhenries; wound on 33KΩ resistor
L32	Shunt Peak. Coil	6Ω			19-3180	TV-184	6180	180 Microhenries; Note 4
L33	Series Peak. Coil	6Ω		RLI-193	19-3160 ▲	TV-184 ▲	4644 ▲	150 Microhenries; wound on 33KΩ resistor
L34	1st Sound IF	2.3Ω		RLI-182	20-1005	TV-151	1469	G. E. Part # includes C69 & C70; Note 5
L35	2nd Sound IF	4.4Ω	4.4Ω	RLI-180	16-3445	TV-108	1466	
L36	Ratio Det.	8.5Ω	.6ΩCT	RTD-014	17-3493 ■	TV-115 ▲	1498 ■	Includes 120Ω resistor
L37	Audio Coupling	3Ω		RLI-154	19-1003		4608	3.3 Microhenries; IRC Part # CLA
L38	Horiz. Osc.	110Ω		RLC-125	19-1577			
L39	RF Choke	8.2Ω		RLI-138	19-1005		4612	10 Microhenries; IRC Part # CL-1
L40	RF Choke	8.2Ω		RLI-138	19-1005		4612	10 Microhenries; IRC Part # CL-1
L41	RF Choke	2.2Ω		RLF-024	19-3036	TV-180	6176	31 Microhenries

Note 1. Complete antenna switch wafer with capacitors and coils (Part # RSX-024).
Note 2. Some models may use 270 Microhenries shunt peaking coil in this application (Part # RLI-209).
Note 3. Not used in all models.
Note 4. Some models may use 120 Microhenries shunt Peaking coil in this application (Part # RLI-205).
Note 5. Includes core; core Part # REI -026).
† Detune trap winding.
* Use one winding only.
▲ Parallel with 33KΩ resistor.
■ Add 120Ω resistor externally.
▲ Use adaptor plate and add 120Ω resistor externally.
♦ Parallel with 4.3KΩ resistor.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	General Electric PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L42	.320A	70Ω	3.8HY	RLF-061					

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			General Electric PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	4A 125V	REF-010	RJB-027	313004. (3AG S/B-4A)	Special	MDX4	
M2	3AG S/B P/T	1/4A 250V	REF-006		315.250 (3AG S/B P/T-1/4A)		MDV 1/4	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		General Electric PART No.	SYLVANIA PART No.		
M3	1N64	RED-003	1N132		Video detector (pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	General Electric PART No.	NOTES
M4A	Tuner	RJX-051	
B	Tuner	RJX-055	
M5	Video Detector Assembly	RLX-038	(Includes crystal diode)
M6	Switch	RSS-005	Local-fringe
M7A	Focus Magnet	RLF-058	Includes centering device-Models 21C225, 21C226, 21C227
B	Focus Magnet	RLF-065	Models 21C228, 21C229, 21C230, 21C231, 21C232, 21C233, 21T20 and 21T21
M8	Ion Trap	RET-013	
M9	Correction Magnet	REA-005	(2 used)
	Cabinet	RAV-219	Model 21C225
	Cabinet	RAV-220	Model 21C226
	Cabinet	RAV-221	Model 21C227
	Cabinet	RAV-215	Model 21C228
	Cabinet	RAV-222	Model 21C229
	Cabinet	RAV-231	Model 21C230
	Cabinet	RAV-232	Model 21C231
	Cabinet	RAV-230	Model 21C232
	Cabinet	RAV-233	Model 21C233
	Cabinet	RAV-217	Model 21T20
	Cabinet	RAV-218	Model 21T21
	Knob	RDK-328	Contrast (Aluminum & brass)
	Knob	RDK-329	Off/on volume (Aluminum & brass)
	Knob	RDK-330	Fine tuning (Aluminum & brass)
	Knob	RDK-331	Channel Selector (Aluminum & brass)
	Knob	RDK-332	(2) brightness or vertical hold (Alumimum & brass)
	Knob	RDK-333	Off/on volume (grey-green)
	Knob	RDK-334	Channel Selector (grey-green)
	Knob	RDK-335	(2) brightness or vertical hold (grey-green)
	Safety Glass	RDW-067	

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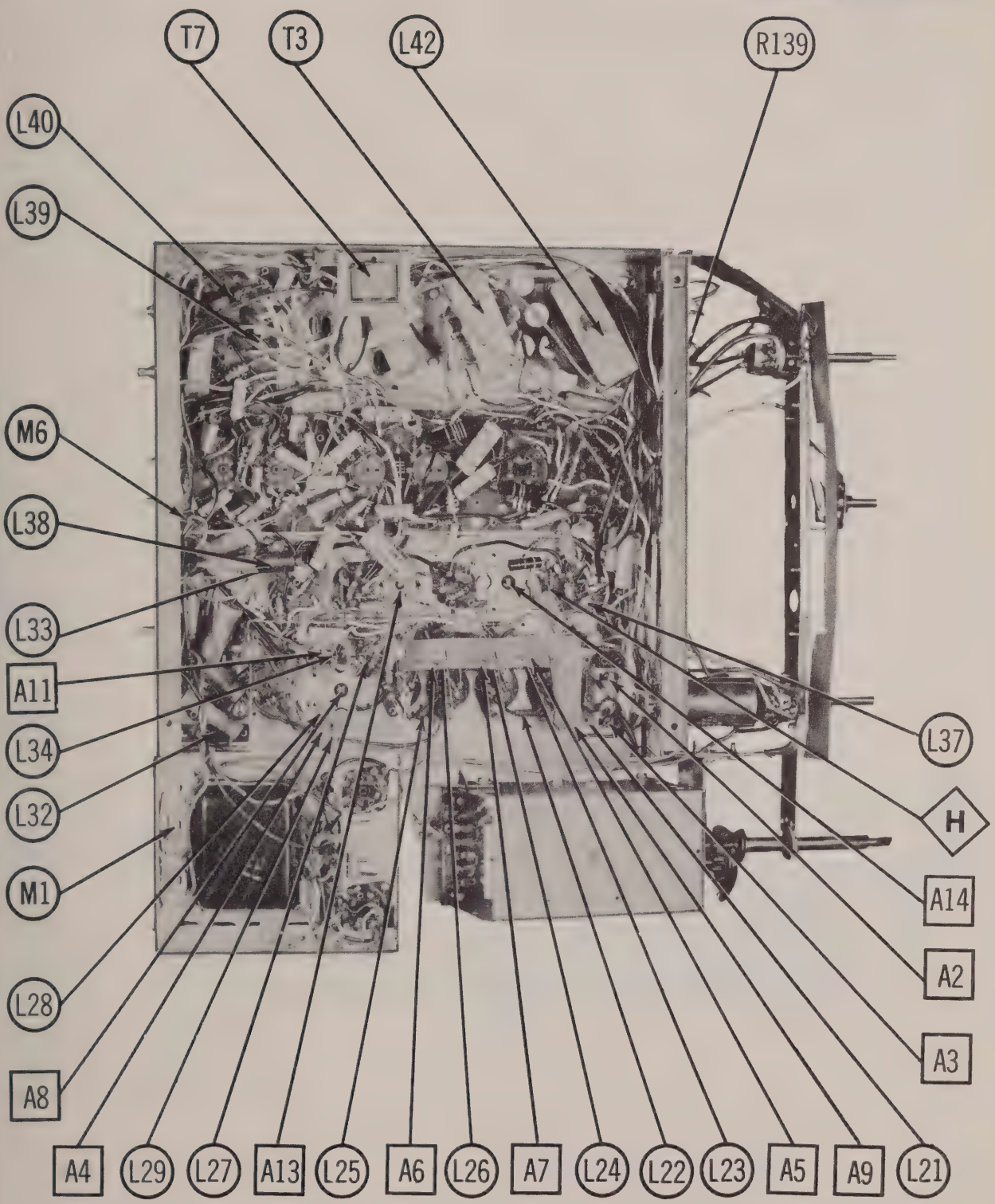
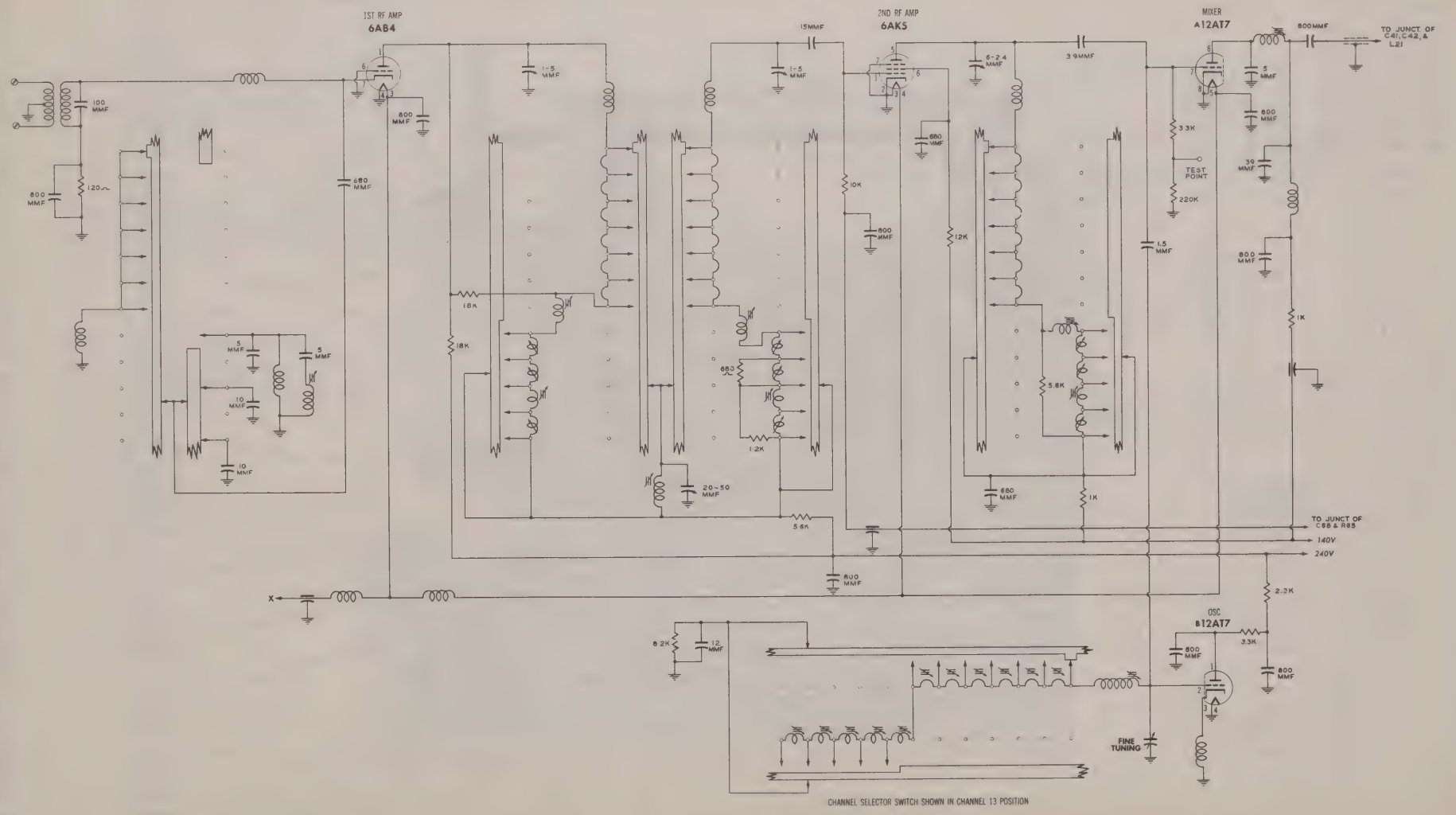


CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



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ALTERNATE TUNER USED IN SOME MODELS

ALTERNATE TUNER SCHEMATIC

TROUBLE SHOOTING AIDS (cont)

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HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check fuse M2. Check by substitution V19, V20, V21 and V22. Check waveform W22.

If Satisfactory	If Unsatisfactory
Check L41, R137, T2, T4A, C122 and other associated circuit components.	Check C116, C117, C121, R127, R131 and other associated circuit components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V19, V20, V21, V22, V23 and V24. Check picture tube. Proceed as outlined under "Loss Of High Voltage".

BLOOMING

Check by substitution V19, V20, V21 and V22. Check L41, R137, T2, T4A and other associated circuit components.

GENERAL

RASTER SOUND NO PICTURE

Follow procedure outlined under "Loss Of Video".

RASTER PICTURE NO SOUND

Follow procedure outlined under "Weak Or No Sound".

RASTER NO SOUND NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6 and V7. Check associated components.

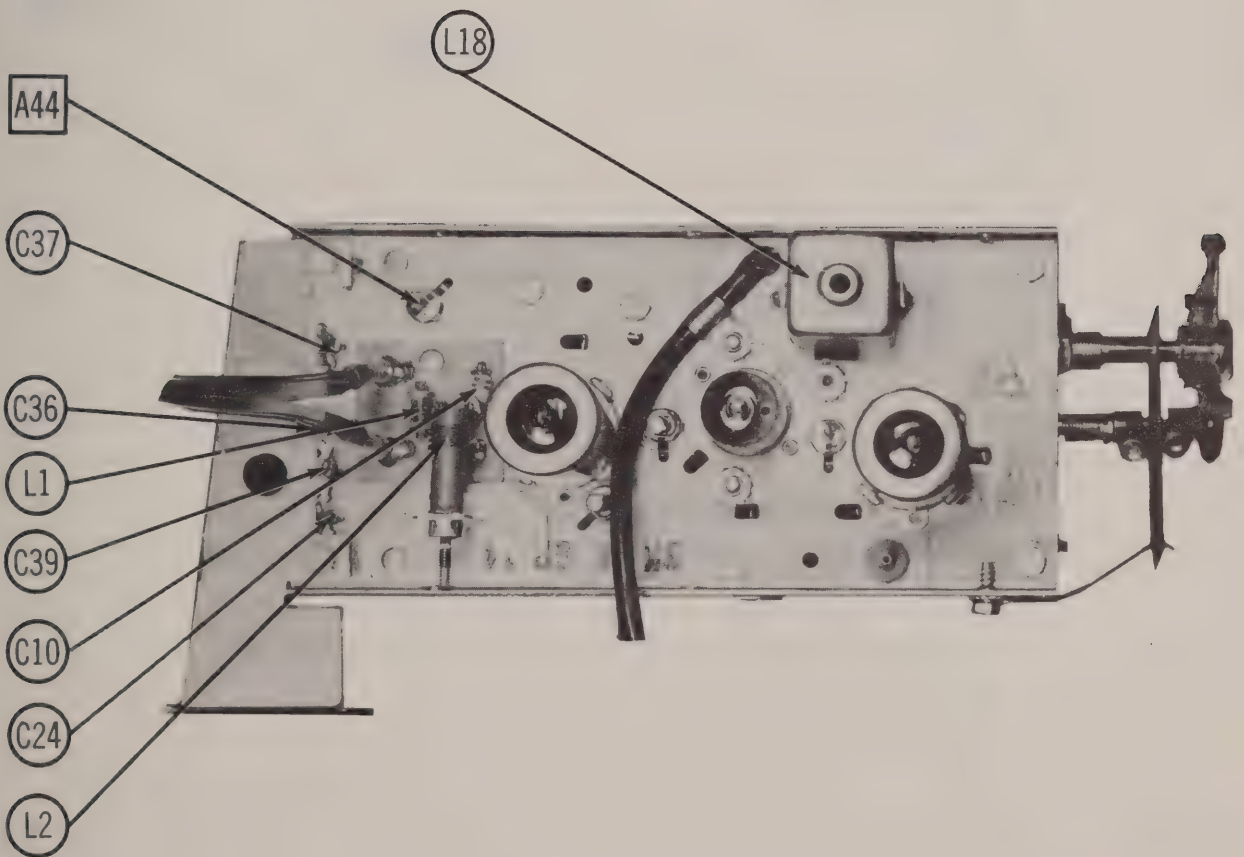
NO RASTER NO SOUND

Follow procedure outlined under "Dead Set".

INTERMITTENT STREAKS

Check video signal for interference pulses. Check high voltage section for corona discharge and arcing. Check picture tube ground strap for external coating for good contact.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



RF TUNER TOP VIEW

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the RF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

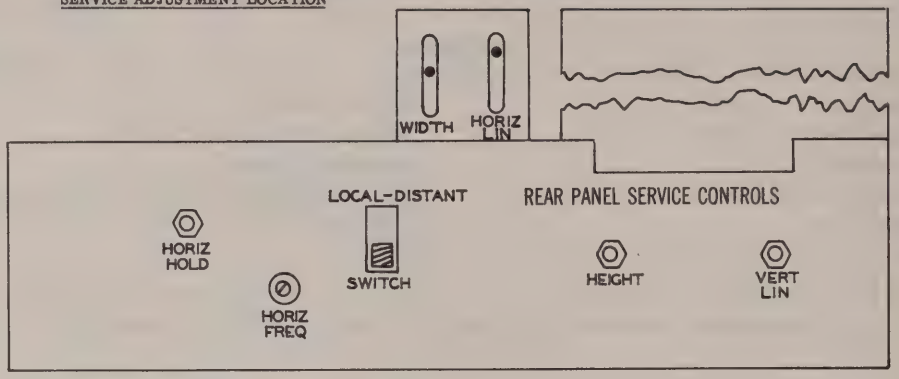
PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal oscillator slug (L38) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L36) located on top of chassis. (See tube placement chart).

FUSES

Two fuses are used. One for horizontal sweep circuit protection and one for LV power supply protection. (For location, see tube placement chart).

CENTERING

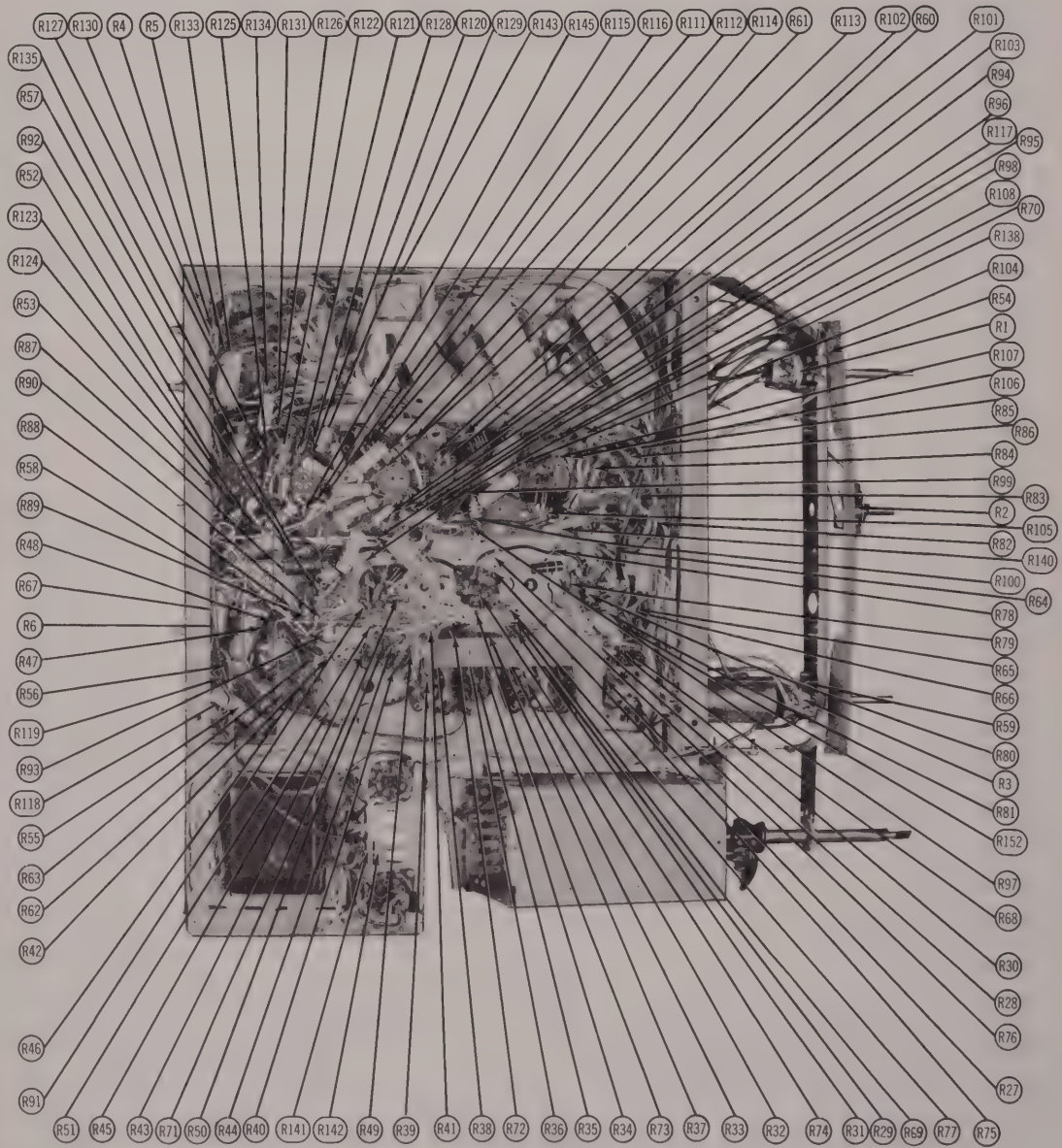
Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side,and up and down until the picture is properly centered.

ANTI-PIN CUSHION ADJUSTMENT

Reduce the picture size so that the sides of the raster are visible, and position the magnets so that all sides are straight lines and the corners are at right angles.

DISASSEMBLY INSTRUCTIONS

1. Remove 6 push on type control knobs from front panel.
2. Remove 8 wood and 1 metal screws. Remove rear cover.
3. Disconnect built-in antenna,transmission line, CRT socket, HV leads, yoke plug, and speaker leads.
4. Remove 5 chassis bolts. Remove chassis.
5. Remove 4 speaker nuts. Remove speaker.



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CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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MOTOROLA MODELS 17K17, B, 17T15A, AE, 17T16, B, 21C2, B, 21F5, B, 21K12A, AB, WA, 21K13, B, 21K14, B, 21K15, 21K16, W, 21K17, 21T8A, AE, 21T11, B, W, Y17K17, B, Y17T15A, AE, Y17T16, B, Y21C2, B, Y21F5, B, Y21K12A, AB, WA, Y21K13, B, Y21K14, B, Y21K15, Y21K16, W, Y21K17, Y21T8A, AE, Y21T11, B, W (Ch. T5402, Y, T5502, Y, TT5-502, Y, VT5-402, Y, VT5-502, Y, WT5502, Y)

MODEL Y17T15A

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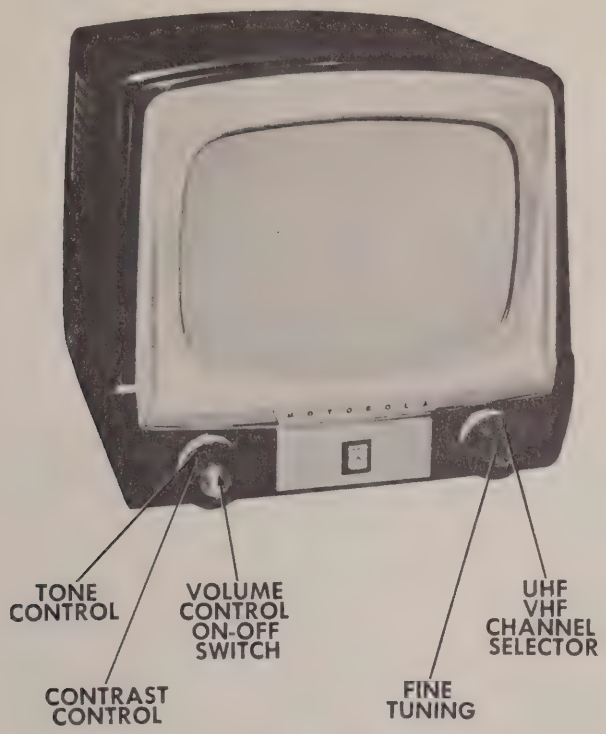
MOTOROLA MODELS

17K17, B, 17T15A, AE, 17T16, B, 21C2, B, 21F5, B, 21K12A, AB, WA, 21K13, B, 21K14, B, 21K15, 21K16, W, 21K17, 21T8A, AE, 21T11, B, W, Y17K17, B, Y17T15A, AE, Y17T16, B, Y21C2, B, Y21F5, B, Y21K12A, AB, WA, Y21K13, B, Y21K14, B, Y21K15, Y21K16, W, Y21K17, Y21T8A, AE, Y21T11, B, W



MOTOROLA MODEL Y17T15A (Ch. VTS-402YA-04)

TRADE NAME	Motorola	MODELS	CHASSIS	VHF TUNER	UHF TUNER
		17K17, 17K17B, 17T16, 17T16B	TS-402	TT53	
		Y17K17, Y17K17B, Y17T16, Y1716B	TS-402Y	TT53Y	TT37
		17T15A, 17T15AE	VTS-402	TT61	
		Y17T15A, Y17T15AE	VTS-402Y	TT61Y	TT37
		21C2, B, 21F5, B, 21K13, B, 21K14, B, 21K15, 21K16, W, 21K17	TS-502	TT53	
		Y21C2, B, Y21F5, B, Y21K13, B, Y21K14, B, Y21K15, Y21K16, W, Y21K17	TS-502Y	TT53Y	TT37
		21K12A, 21K12AB, 21K12WA	WTS-502	TT53	
		Y21K12A, Y21K12AB, Y21K12WA	WTS-502Y	TT53Y	
		21T8A, 21T8AE	TTS-502	TT61	
		Y21T8A, Y21T8AE	TTS-502Y	TT61Y	TT37
		21T11, 21T11B, 21T11W	VTS-502	TT53	
		Y21T11, Y21T11B, Y21T11W	VTS-502Y	TT53Y	TT37

MANUFACTURER — Motorola, Inc., 4545 Augusta Blvd., Chicago, Ill.
TYPE SET — Television Receiver
TUBES — Nineteen
POWER SUPPLY — 110-120 Volts AC-60 Cycle — RATING 1.4 Amp. @ 117 Volts AC
TUNING RANGE — Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

MODELS 21F5, Y21F5, 21F5B and Y21F5B USE RADIO (AM-FM) CHASSIS HS-409 AND RECORD CHANGER VM3RC.

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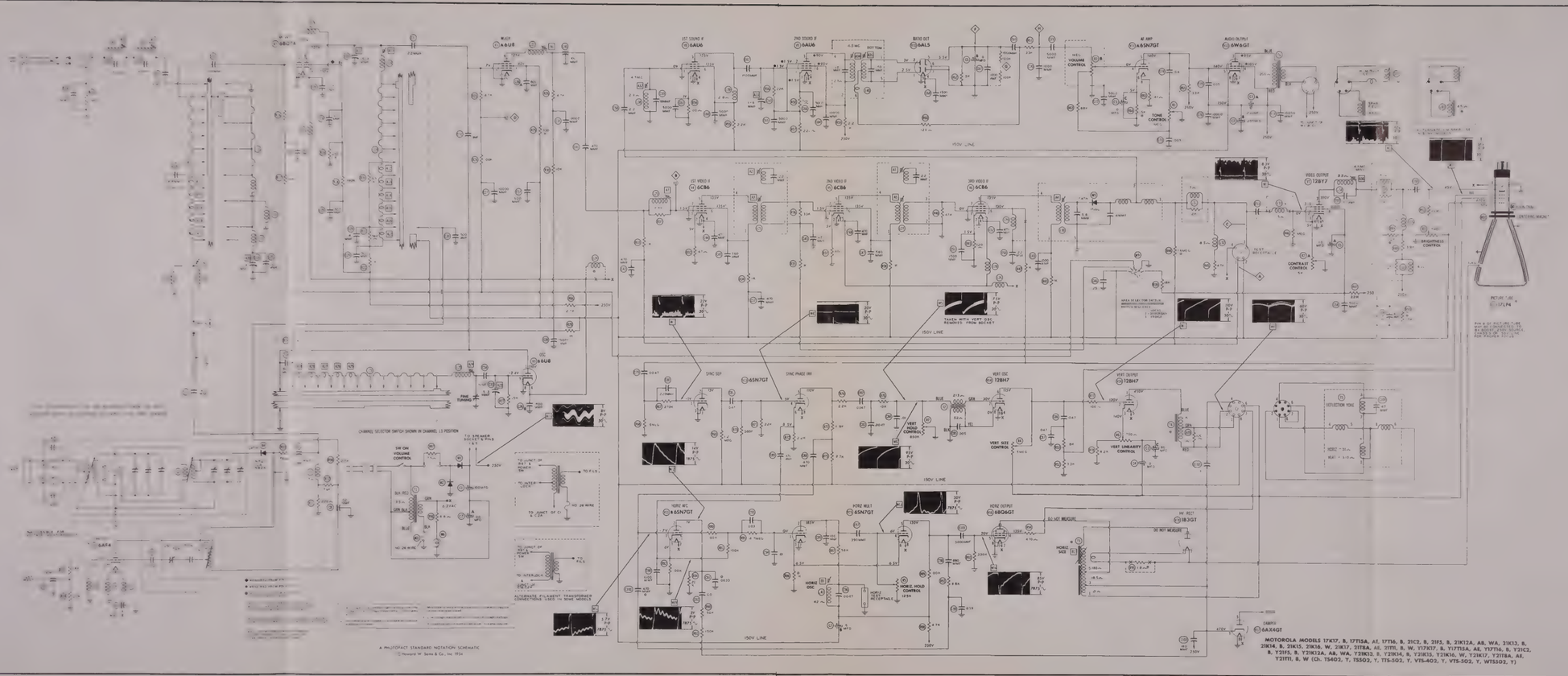

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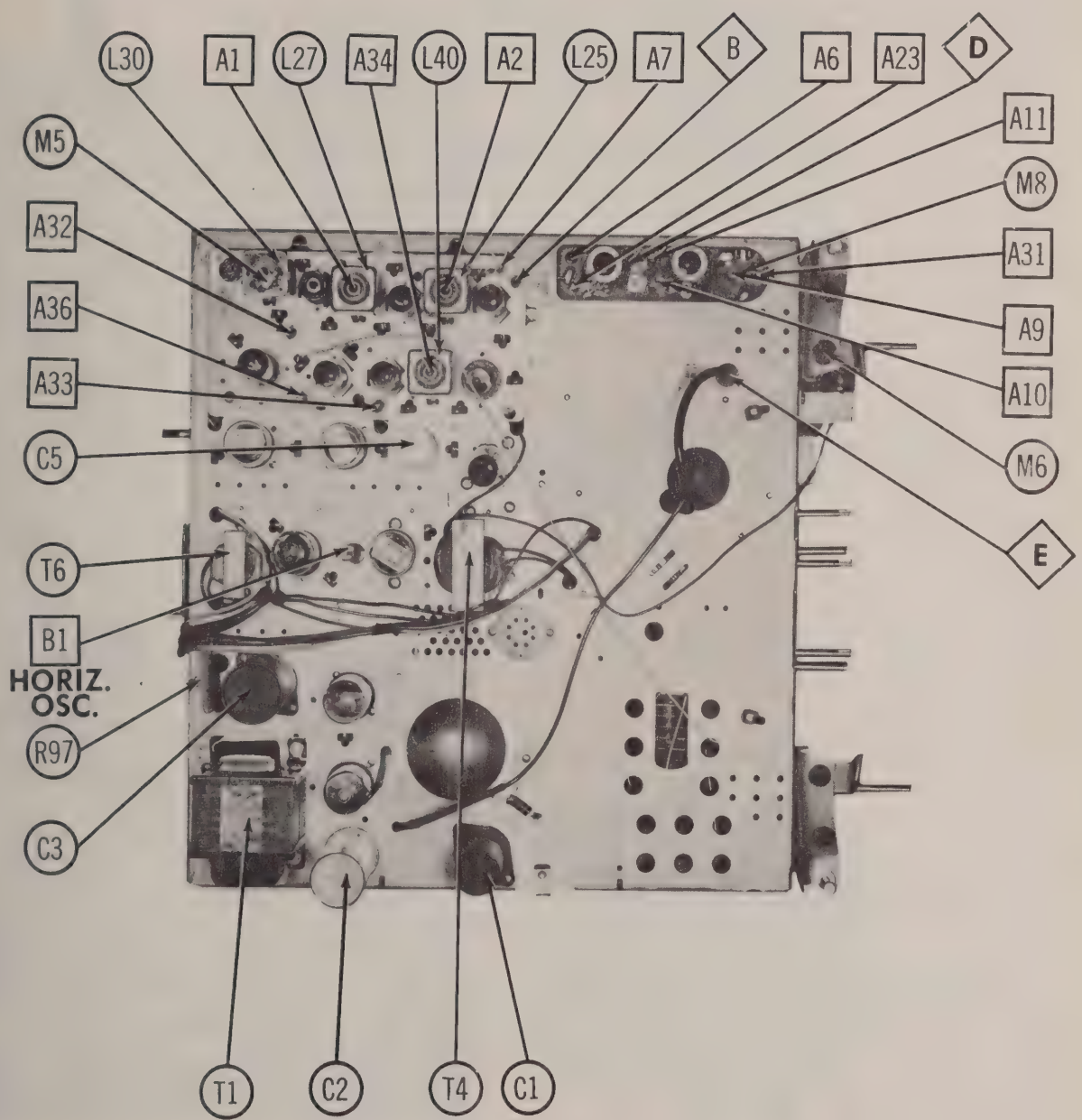

CHASSIS TOP VIEW

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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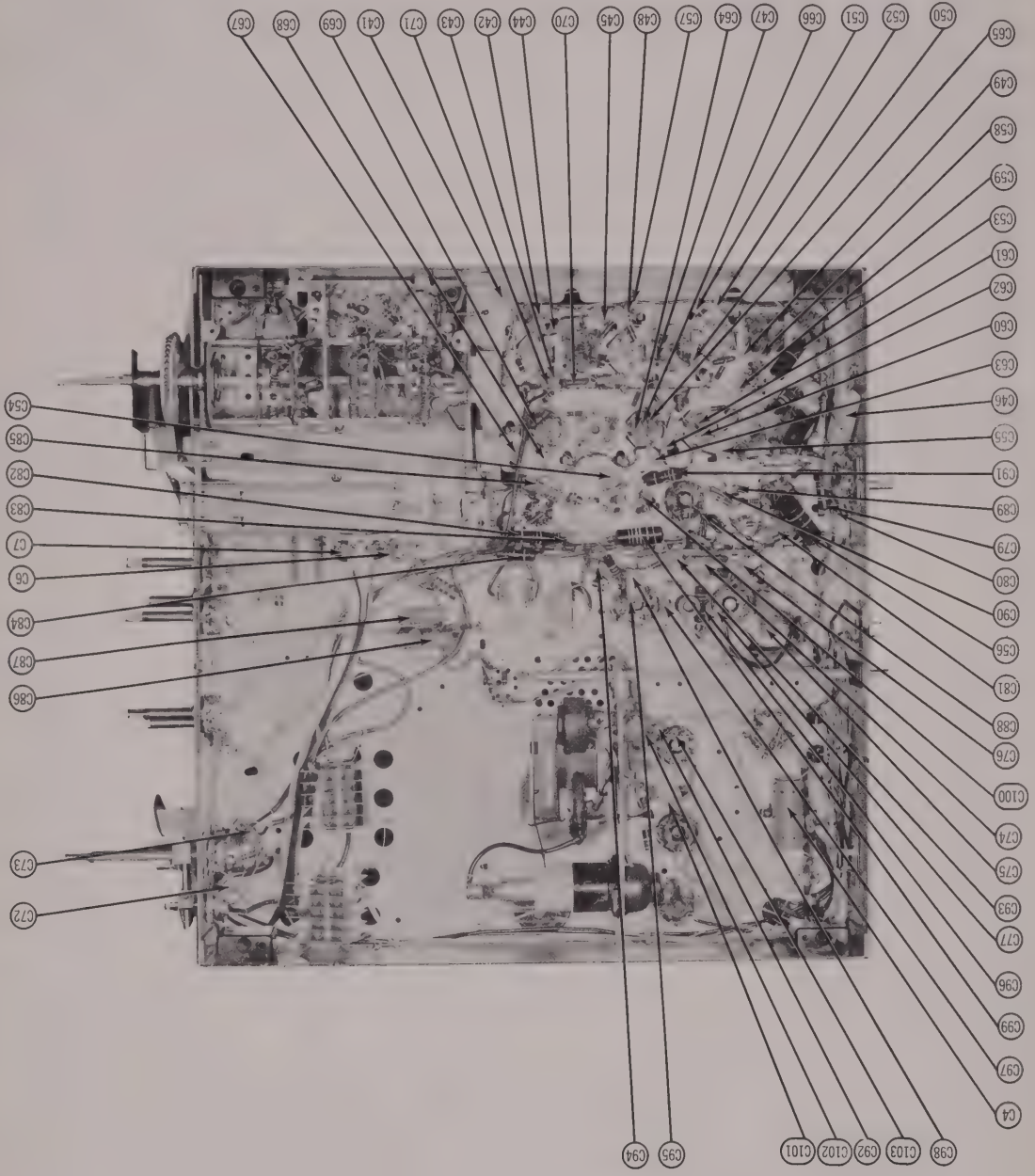

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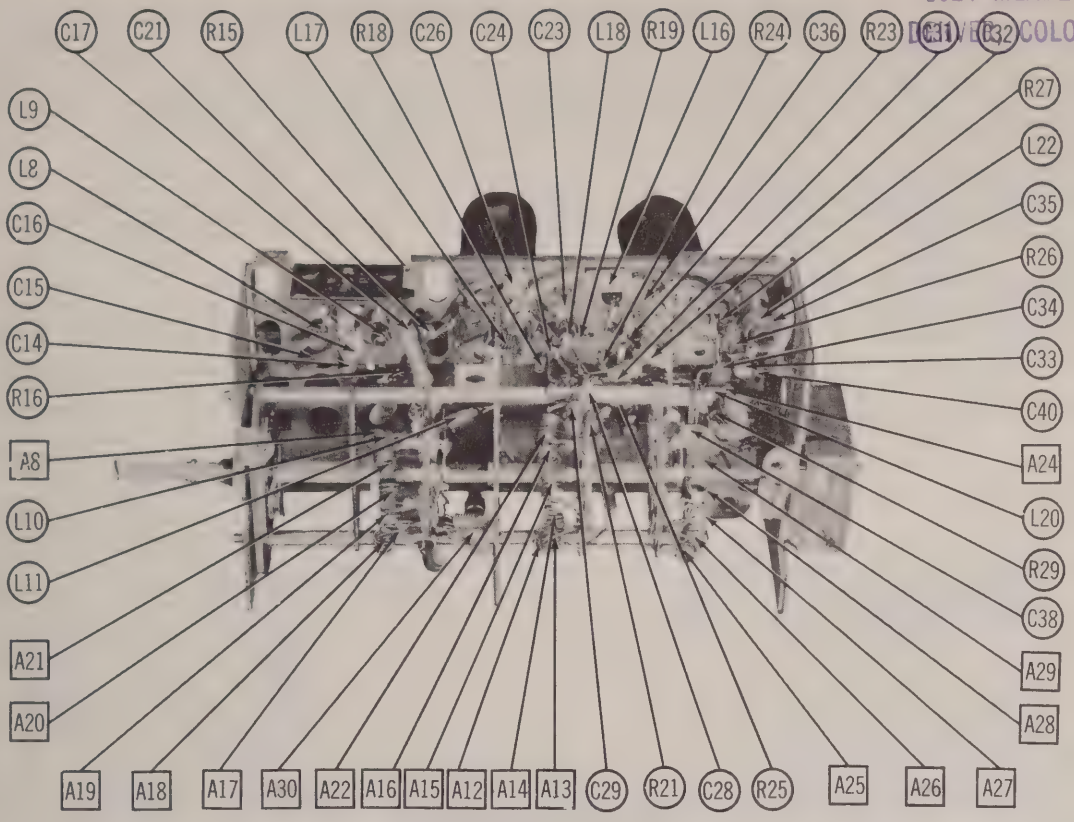
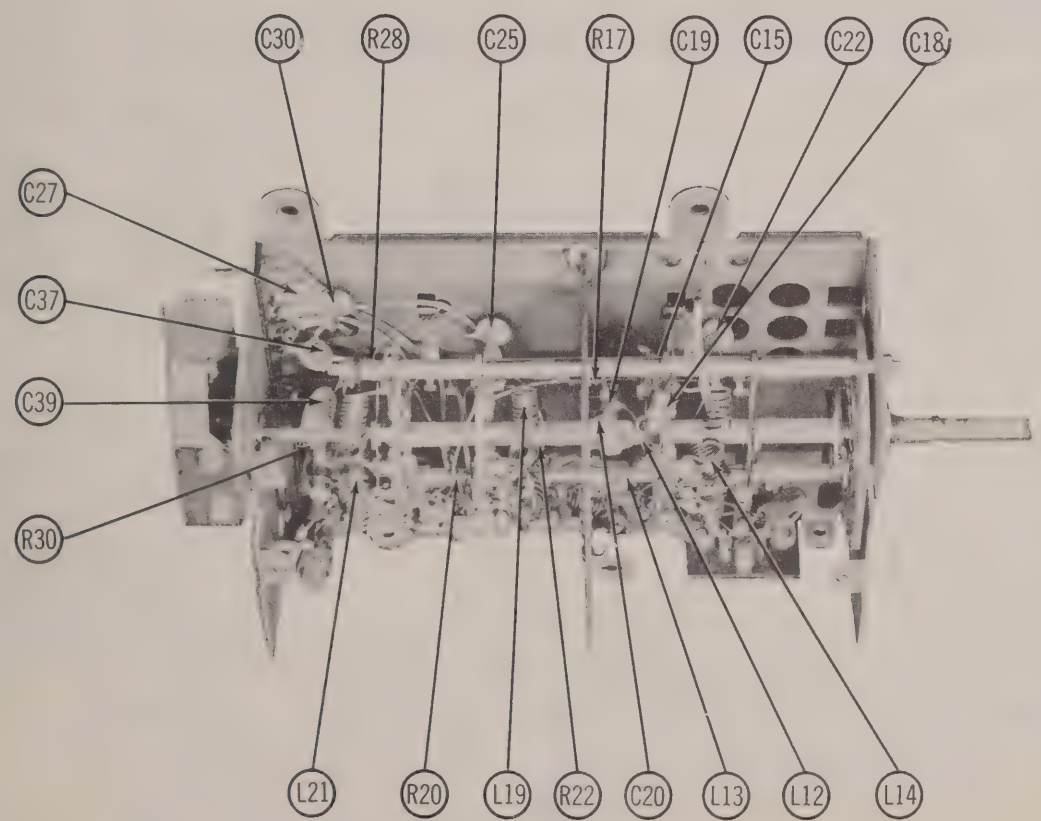


VHF TUNER-RIGHT SIDE



VHF TUNER-LEFT SIDE

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V15) from its socket. Use an isolation transformer to protect the test equipment.

VIDEO IF ALIGNMENT

Attenuate the sweep generator to maintain 3 to 5 volts peak to peak on scope at point (C). If the sweep generator has no built-in markers, loosely couple the output of an accurately calibrated AM signal generator to the video IF strip. The IF coils and traps have two points of resonance.
The correct settings are with the cores away from the center of the coil form so as not to affect coupling between coil and trap windings.
Set "Area Selector" switch to "Local" position.
Connect the negative side of a 3 volt bias supply thru 47KΩ to point (A). Connect positive lead to chassis.
Disable local oscillator by shorting pin 9 (grid) of 6U8 (V3) to chassis with short lead.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to point (B). Low side to chassis. Use very short leads.	44MC (10MC Swp)	41.25MC	13	Vert. Amp. thru 47KΩ to point (C). Low side to chassis.	A1	Adjust so that trap notch falls at 41.25MC. Use sufficient generator output so that trap notch is clearly defined (Fig.1).
2.	"	"	"	47.25MC	"	"	A2	Adjust so that trap notch falls at 47.25MC. Temporarily remove the -3 volts bias to provide better trap notch definition (Fig.1).
3.	"	"	"	45.75MC	"	"	A3, A4	Adjust A3 to place 45.75MC marker at 60% on high side of response curve. Simultaneously adjust A4 for flat top and symmetrical response similar to Fig. 1.
4.	"	"	"	42.25MC	"	"	A5	Adjust to place 42.25MC marker at 50% on response curve. Simultaneously retouch A4 to obtain response similar to Fig. 1.
5.	"	High side to point (D). Low side to chassis. Use very short leads.	"	41.25MC 42.25MC 45.25MC 47.25MC	"	"	A6, A7	Simultaneously adjust A6 and A7 for response similar to Fig. 2. A6 positions curve and A7 has leveling effect. To check the 41.25MC and 47.25MC trap attenuation connect the DC probe of VTVM to point (C). Common to chassis. Take readings with marker generator set to 41.25MC, 44.0MC and 47.25MC. The voltage ratio between 41.25MC and 44.0MC should be between 30 and 65 and the voltage ratio between 47.25MC and 44.0MC should be between 100 and 200.

REGENERATION CHECK

Leave pin 9 of V3 shorted to chassis but remove 3 volt bias supply. With generator and scope connected as in step 5 observe response curve. Any regeneration will be indicated by sharp peaks on the response curve.

IF SENSITIVITY MEASUREMENT

Connect the high side of an AM signal generator to point (B). Low side to chassis. Set signal generator to 44.0MC. Remove bias supply from point (A). Set "Area Selector" switch to "fringe" position. Connect the DC probe of VTVM to point (C). Common to chassis.
A signal of less than 750 microvolts from generator should produce one volt on VTVM.

MIXER SENSITIVITY MEASUREMENTS

Connect the high side of an AM signal generator thru .001MFD capacitor to point (D). Low side to chassis.
Set signal generator to 44.0MC. Short out R23 (4700Ω).
Remove bias supply from point (A). Set "Area Selector" switch to "fringe" position. Switch channel selector to UHF (channel 1) position. A signal of less than 100 microvolts from generator should produce one volt at VTVM.

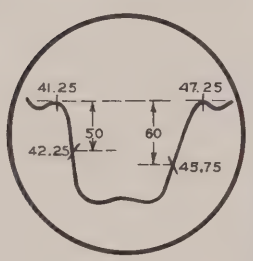


FIG.1

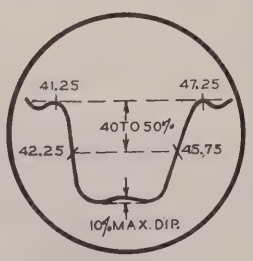


FIG.2

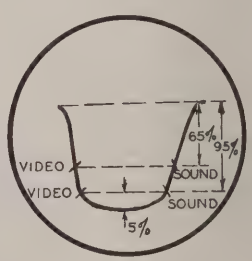


FIG.3

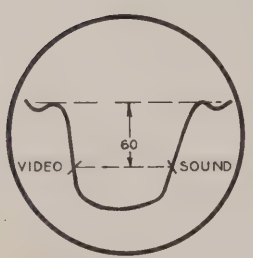


FIG.4

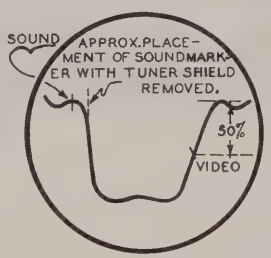
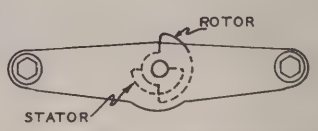


FIG.5



FINE TUNING ROTOR POSITION FOR ALIGNMENT.

FIG.6

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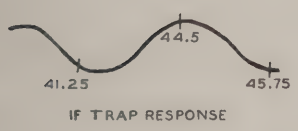
ALIGNMENT INSTRUCTIONS (cont)

RF AND MIXER ALIGNMENT

Set the "Area Selector" switch to "Suburban" or "fringe" position.
This grounds the tuner AGC line. Preset A8 and A9 fully into coil. Preset A10 midway into coil. Remove tuner shield.
Remove horizontal output tube (V16) and connect a 5000Ω, 10 watt resistor from B++ (pin 5 of damper tube or center lug of video testjack) to ground.
Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Two 120Ω Carbon Resistors	Across antenna terminals (Balun line) with 120Ω in each lead.	177MC (20MC Swp)	175.25MC 179.75MC	7	Vert. Amp. thru 47KΩ to point (D). Low side to chassis.	A11, A8	Adjust A-11 so that sound and video markers fall within limits shown in Fig. 3. Adjust A8 until side of channel 7 is affected, then back off A8 so it just stops affecting channel 7. (Turning core in too far may affect channel 6).
7.	"	"	213MC (20MC Swp)	211.25MC 215.75MC	13	"	A10	Adjust for response curve similar to Fig. 3. Be sure markers fall within limits shown. Recheck channel 7. If necessary, retouch A-11 (make no further adjustment of A8)
8.	"	"	207MC (20MC Swp)	205.25MC 209.75MC	12	"		Check for response curve similar to Fig. 3. (If response is checked with tuner shield cover in place, the video marker will move up the curve a short distance, but markers should be within tolerance)
			201MC (20MC Swp)	199.25MC 203.75MC	11			
			195MC (20MC Swp)	193.25MC 197.75MC	10			
			189MC (20MC Swp)	187.25MC 191.75MC	9			
			185MC (20MC Swp)	181.25MC 185.75MC	8			
			177MC (20MC Swp)	175.25MC 179.75MC	7			
9.	"	"	85MC (20MC Swp)	83.25MC 87.75MC	6	"	A12, A17	Adjust A12 by compressing or expanding coil turns to obtain response similar to Fig. 4 with markers not falling below 60%, Usually the antenna coils A17 thru A21 are not to be adjusted. If the antenna coils have been distorted they may be adjusted by compressing or expanding coil turns for maximum response in conjunction with the RF coils (A12 thru A16). If it is necessary to adjust any antenna coil in following steps then the UHF coil adjustment of A8 must be repeated as in step 6.
10.	Two 120Ω Carbon Resistors	Across antenna terminals (Balun Line) with 120Ω in each lead.	85MC (20MC Swp)	83.25MC 89.75MC	6	Vert. Amp. thru 47KΩ to point (D). Low side to chassis.	A9	Adjust FM trap core, A9 until a SLIGHT effect is noted on sound side of response curve (Fig. 4).
11.	"	"	79MC (20MC Swp)	77.25MC 81.75MC	5	"	A13, A18	Adjust A13 by compressing or expanding coil turns for response similar to Fig. 4. For A18 see remarks step 9 .
12.	"	"	69MC (20MC Swp)	67.25MC 71.75MC	4	"	A14, A19	Adjust A14 for response similar to Fig. 4. For A19 see remarks step 9.
13.	"	"	63MC (20MC Swp)	61.25MC 65.75MC	3		A15, A20	Adjust for response similar to Fig. 4. For A20 see remarks step 9.
14.	"	"	57MC (20MC Swp)	55.25MC 59.75MC	2	"	A16, A21	Adjust for response similar to Fig. 4. For A21 see remarks step 9. Replace tuner shield and recheck channels 13 thru 2. Response of channel 13 thru 7 must be within limits shown in Fig. 3. Response on channels 6 thru 2 must be similar to Fig. 4 with markers not falling below 60% on response curve.
15.	Direct	High side to point (E). Low side to chassis.	44MC (20MC Swp)	42.25MC 46.75MC	UHF (Channel 1)	"	A22	Remove tuner shield. Adjust A22 by compressing or expanding coil for response curve similar to Fig. 4. Replace tuner shield.



IF TRAP RESPONSE

FIG. 7

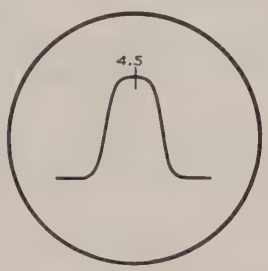


FIG. 8

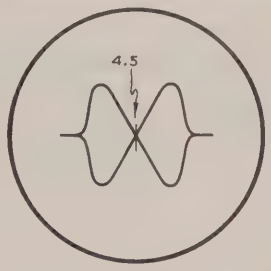


FIG. 9

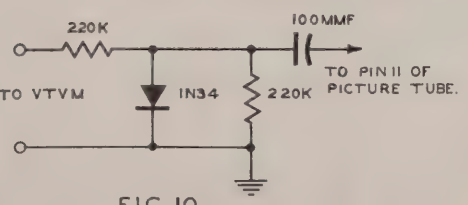


FIG. 10

MOTOROLA MODELS 17K17, B, 17T15A, AE, 17T16, B, 21C2, B, 21F5, B, 21K12A, AB, WA, 21K13, B, 21K14, B, 21K15, 21K16, W, 21K17, 21T8A, AE, 21T11, B, W, Y17K17, B, Y17T15A, AE, Y17T16, B, Y21C2, B, Y21F5, B, Y21K12A, AB, WA, Y21K13, B, Y21K14, B, Y21K15, Y21K16, W, Y21K17, Y21T8A, AE, Y21T11, B, W

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Remove shorting jumper from pin 9 of V3 to chassis.
Replace bias supply as under video IF alignment.
Set "Area Selector" switch to "Local" position.
Use only enough sweep generator output to produce usable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range. See Fig. 6.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 120Ω Carbon Resistors	Across antenna terminals (Balun Line) with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 47KΩ to point (C). Low side to chassis.	A23	Adjust to place sound marker SLIGHTLY higher in frequency than the sound trap notch. This allowance must be made due to removal of tuner shield. With shield replaced, the sound marker should move down into the trap notch. Check channels 7 thru 13 noting whether sound marker for each channel falls just above the trap notch. Response should be similar to Fig. 5. If more than a 30 degree rotation of fine tuning control is necessary to place sound marker in proper position on any high band channel adjust A24. If A24 is adjusted it may be necessary to readjust A23 on channel 10.
			213MC (10MC Swp)	211.25MC 215.75MC	13			
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
17.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A25	Check to see that fine tuning is at mid-capacity as in Fig. 6. Adjust A25 by compressing or expanding coil to place sound marker just above trap notch as in Fig. 5.
18.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A26	Adjust by compressing or expanding coil to place sound marker just above trap notch (See Fig. 5) with fine tuning within 15 degrees of position shown in Fig. 6.
			69MC (10MC Swp)	67.25MC 71.75MC	4		A27	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A28	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A29	

UHF TUNER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver should not be required in the field.

CHANNEL 7 INTO 6 INTERFERNECE TRAP AND IF TRAP ALIGNMENT

Instructions same as for oscillator alignment.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
19.	Two 120Ω Carbon Resistors	Across antenna terminals (Balun Line) with 120Ω in each lead	85MC (10MC Swp)	83.25MC 87.75MC	6	Vert. Amp. thru 47KΩ to point (C). Low side to chassis.	A30	This is channel 7 into 6 trap adjustment. Set fine tuning so that sound marker falls into trap notch. Increase sweep generator output to produce visible response on scope. Adjust A30 for MINIMUM response.
20.	"	"	44.5MC (10MC Swp)	41.25MC 44.5MC 45.75MC	2	"	A31	Increase sweep generator output to produce visible response on scope. Adjust A31 for MINIMUM response similar to Fig. 7.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (F) to chassis. The junction of these two resistors is alignment point (G) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
21.	Direct	High side to point (C). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe thru 10KΩ to point (F). Common to chassis.	A32, A33, A34	Adjust for maximum deflection.
22.	"	"	"	"	DC probe to point (H) Common to point (G).	A35	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. For best accuracy repeat steps 21 & 22.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
21.	Direct	High side to point (C). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. thru 10KΩ to point (F). Low side to chassis.	A32, A33, A34	Disconnect stabilizing capacitor C5B. Adjust for curve of maximum amplitude and symmetry similar to Fig. 8.
22.	"	"	"	"	"	Vert. Amp. to point (H). Low side to chassis.	A35	Reconnect stabilizing capacitor C5B. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 9. SLIGHTLY retouch A34 for maximum amplitude and straightness of crossover lines.

SOUND IF ALIGNMENT USING TV SIGNAL AND VTVM

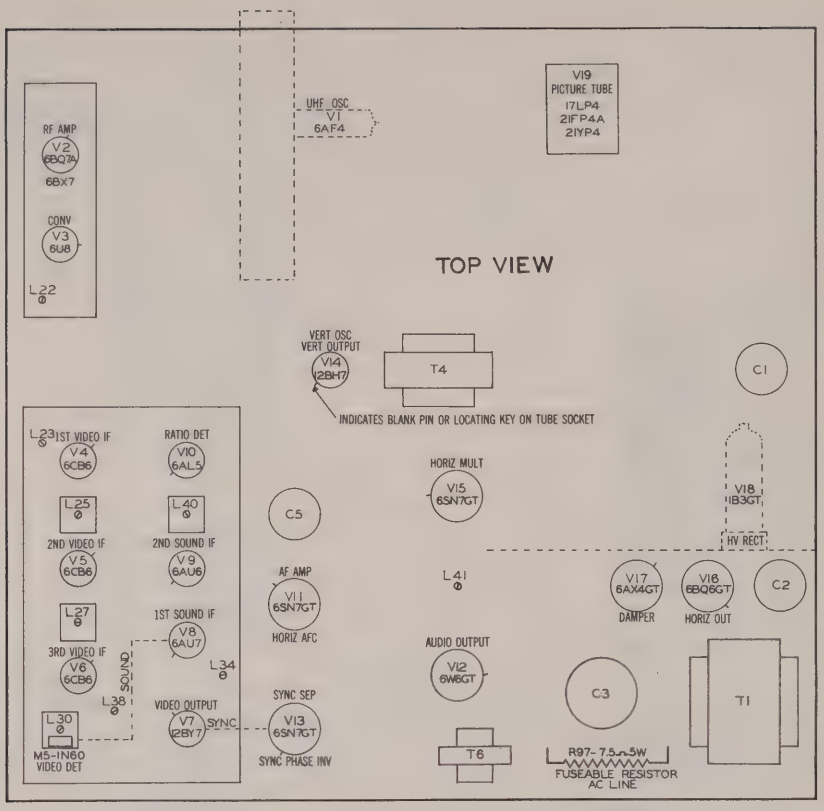
This method provides an accurate signal source.
Tune in a TV station. See steps 21 and 22 of "Sound If Alignment Using AM Signal Generator and VTVM" for VTVM connections and adjustment of A32 thru A35 for sharp alignment, turn fine tuning slightly off station so that VTVM reads 6 to 8 volts from point F to chassis.

4.5MC TRAP ALIGNMENT

Set contrast control fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
23.	Direct	High side to point (C). Low sid e to chassis.	4.5MC (Unmod)	Any non-interfering channel.	DC probe thru detector (Fig. 10) to pin 11 of picture tube. Low side to chassis.	A36	Adjust for MINIMUM deflection. Remove 5000Ω, 10 watt resistor from pin 5 of V17. Replace V16 on its socket.

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - Sel Rectifiers (M1 & M2) Fuse (M3)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V12 (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V7, V19
Has pic, no sound - V8, V9, V10, V11, V12

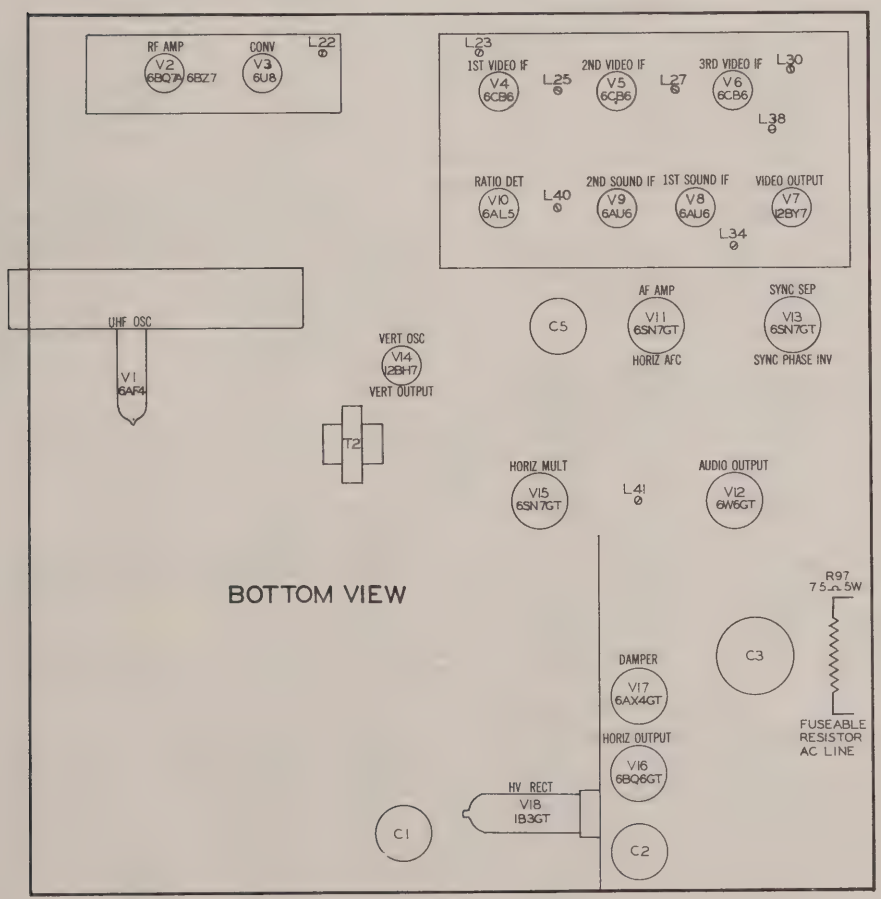
SYNC FAILURE
No vert. sync - V13, V14
No horiz. sync - V11, V13, V15
No vert. or horiz. sync - V13

SWEEP FAILURE
No raster, has sound - V15, V16, V17, V18, V19
No vertical deflection - V14
Poor vert. linearity or foldover - V14
Poor horiz. linearity or foldover - V15, V16, V17
Narrow picture - V15, V16, V17, V18, M1, M2
Vert. off freq. - V13, V14
Horiz. off freq. - V11, V13, V15

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	♦■2. 7KΩ	21KΩ	. 1Ω	0Ω	0Ω	21KΩ	♦■2. 7KΩ		
V 2	6BQ7A	INF	2Meg	0Ω	0Ω	. 1Ω	† 3. 8KΩ	† 250KΩ	INF	0Ω
V 3	6U8	♦ 2KΩ	1. 8Meg	♦330KΩ	. 1Ω	0Ω	♦16KΩ	0Ω	0Ω	15KΩ
V 4	6CB6	1. 6Meg	47Ω	0Ω	. 1Ω	♦ 1KΩ	♦ 1KΩ	0Ω		
V 5	6CB6	1. 6 Meg	47Ω	. 1Ω	0Ω	♦ 1KΩ	♦ 1KΩ	0Ω		
V 6	6CB6	. 1Ω	120Ω	. 1Ω	0Ω	♦ 1KΩ	† 27KΩ	0Ω		
V 7	12BY7	270Ω	1 Meg	270Ω	0Ω	0Ω	. 1Ω	† 4KΩ	† 22KΩ	270Ω
V 8	6AU6	2. 3Ω	0Ω	0Ω	. 1Ω	♦ 2. 2KΩ	♦ 2. 2KΩ	100Ω		
V 9	6AU6	♦ 22KΩ	♦ 220Ω	0Ω	. 1Ω	† 2. 2KΩ	† 2. 2KΩ	♦ 320Ω		
V 10	6AL5	INF	INF	0Ω	. 1Ω	15KΩ	0Ω	0Ω		
V 11	6SN7GT	300KΩ	.22KΩ	100KΩ	300KΩ	† 33KΩ	1. 2KΩ	. 1Ω	0Ω	
V 12	6W6GT	INF	0Ω	† 200Ω	† 0Ω	† 33KΩ	INF	. 1Ω	100KΩ	
V 13	6SN7GT	1. 8 Meg	♦ L. 2Meg	0Ω	22KΩ	♦ 9. 5KΩ	2. 2KΩ	0Ω	. 1Ω	
V 14	12BH7	▲ 1K	▲ 2. 9Meg	8. 5KΩ	. 1Ω	. 1Ω	▲ 2. 9Meg	650KΩ	50Ω	0Ω
V 15	6SN7GT	4. 9Meg	† 10. 4KΩ	1KΩ	100KΩ	† 100KΩ	1KΩ	0Ω	. 1Ω	
V 16	6BQ6GT	INF	. 1Ω	♦ 0Ω	♦ 470Ω	330KΩ	† 100KΩ	0Ω	0Ω	TOP CAP ▲ 18. 5Ω
V 17	6AX4GT	▲ 300KΩ	▲ 52Ω	10 Meg	22KΩ	† 0Ω	INF	. 1Ω	0Ω	
V 18	1B3GT	PINS 1-8 HAVE INF. RESISTANCE								TOP CAP ▲ 200Ω
V 19	17LP4	. 1Ω	3. 3KΩ	PIN 6 ♦ 0Ω	PIN 10 ▲ 21Ω	PIN 11 ♦ 300KΩ	PIN 12 0Ω			

♦ MEASURED FROM PIN 8 OF V12.
■ MEASURED IN UHF POSITION.
† MEASURED FROM OUTPUT OF M1.
▲ MEASURED FROM PIN 3 OF V17.



TUBE PLACEMENT CHART

SET 237 FOLDER 8

PROPERTY OF
L. F.
DENVER, COLO.

MOTOROLA MODELS 17K17, B, 17T5A, AE, 17T16, B, 21C2, B, 21F5, B, 21K12A, AB, WA, 21K13, B, 21K14, B, 21K15, 21K16, W, 21K17, 21T8A, AE, 21T11, B, W, Y17K17, B, Y17T5A, AE, Y17T16, B, Y21C2, B, Y21F5, B, Y21K12A, AB, WA, Y21K13, B, Y21K14, B, Y21K15, Y21K16, W, Y21K17, Y21T8A, AE, Y21T11, B, W

TROUBLE SHOOTING AIDS

CAUTION

Use an isolation transformer to remove shock hazzard and prevent damage to receiver and/or test equipment.

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V15, V16 and V17. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C102 and other associated circuit components.	Check C97, C101, R89, R93, and other associated components.

DRIVE LINES

Check by substitution V15, V16 and V17. Check C98, C99, C101, T3, T5A and other associated components for failure or change of value.

COMPRESSED LEFT SIDE

Check by substitution V15, V16 and V17. Check components associated with the horizontal output and damper stages especially T3 and T5A.

FOLDS

Follow procedure outlined under Drive Lines.

PIE CRUST EFFECT

Check by substitution V15, V16 and V17. Check T3, T5A and other associated components for high voltage arc over. Check C94 for open.

XMAS TREE EFFECT

Substitute V15. Check C95, C96, C97, L41 and other associated circuit components.

VERTICAL

LOSS OF SWEEP

Substitute V14. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T4, T5B and other associated components.	Check C86, C87, R4, R77, T2 and other associated components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Substitute V14. Check T4, T5B, C2C and other associated circuit components.

COMPRESSED AT TOP

Substitute V14. Check C86, C87 and other associated components.

FOLDS

Substitute V14. Check associated components for failure or change of value.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V13. Check associated circuit components especially C79, C81, R68 and R69.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Check by substitution V13 amd V14. Check waveform W5.

If Satisfactory	If Unsatisfactory
Check components associated with V14A.	Check vertical integrator network and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V11 and V15. Check associated components especially C95, C96, C97, L41 and R89.

HORIZONTAL BENDING

Check by substitution V11, V15 and V16. Check horizontal AFC filter network for component failure.

VIDEO

LOSS OF VIDEO

Substitute V7. Check C56, R51, R48, L35, L37, picture tube and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best picture and sound. Check adjustment A36. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check contrast control picture tube and other associated circuit components.

NEGATIVE PICTURE

Substitute V7. Check video detector crystal and assembly. Check AGC network for component failure. Check picture tube and other associated components.

SMEAR

Substitute V7. Check video detector assembly. Check C53, C56, R48, R51, L31, L35, L37, picture tube and other associated components for failure or change of value.

WIDE BLACK BAR ACROSS PICTURE

Check V2, V3, V4, V5, V6, and V7 for heater to cathode leakage. In case of UHF check V1.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9, V10, V11 and V12. Check stages V11A and V12 using audio signal generator. Apply audio signal across R2B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V11A and V12 especially T6 and SP1.

BUZZ

Adjust tuner fine tuning for best picture and sound. Adjust A35 for minimum buzz. If still unsatisfactory, substitute V10 and realign ratio detector and Audio IF stages. Check C5B for leakage.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2A	RF Amplifier	6BQ7A	6BQ7A	9AJ	
B	RF Amplifier	6BZ7	6BZ7	9AJ	
V3	Converter	6U8	6U8	9AE	
V4	1st Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output	12BY7	12BY7	9BF	
V8	1st Sound IF	6AU6	6AU6	7BK	
V9	2nd Sound IF	6AU6	6AU6	7BK	
V10	Ratio Detector	6AL5	6AL5	6BT	
V11	AF Amplifier - Horiz. AFC	6SN7GT	6SN7GT	8BD	
V12	Audio Output	6W6GT	6W6GT	7S	
V13	Sync Separator Sync Phase Inv	6SN7GT	6SN7GT	8BD	
V14	Vert. Oscillator - Vert. Output	12BH7	12BH7	9A	
V15	Horiz. Mult	6SN7GT	6SN7GT	8BD	
V16	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V17	Damper	6AX4GT	6AX4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: MOTOROLA PART No.	SYLVANIA PART No.	GENERAL ELECTRIC PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V19A	17LP4	17LP4	17LP4	17LP4	12L	① Circuit changes necessary
		17VP4	17VP4	17VP4	12L	
B	21FP4A	21FP4A	21FP4A	21FP4A	12L	
		21FP4C			12L	
		21FP4 ①			12M	
C	21YP4	21YP4	21YP4	21YP4	12L	
		21YP4A			12L	
		21AFP4 ①			12M	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1	100	150	23B730108	AFHS1-69		XA003		FP116	TVL-1423	
C2A	■100	150	23B730094			D-110		FP419.4	TVL-3450	
B	▲200	150						TC45		
C	▲60	150								
C3A	▲200	150	23B710941	AFHS2-109		B078		FP216.1	TVL-2444	
B	▲5	150								
C4	10	450	23A702450	PRS450/10		BR1045		TC72	TVA-1705	
C5A	■10	300	23B730205	AFH3-22		C021		FP330.5	TVL-3776	
B	▲10	50								
C	10	50								
C6	470			SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C7	470			SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C8	100									
C9	27			SI27	D6-270	TP26	GP1K-270	UC-5427	5GA-Q27	
C10	100									
C11	100									
C12	10									
C13	470			BPD-00047	D6-471	K046	GP2K-471	UC-5347	5GA-T47	
C14	470			SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C15	150			SI150	D6-151	G046	GP2K-151	UC-5315	5GA-T15	
C16	47			SI47N750	TCN-47	N033	N750-801-471	NT-5447	5TCU-Q47	
C17	470			SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C18	6.8					N013	N750A-6R8			
C19	1-6				829-6		3139-01-10			
C20	10			SI10N750	TCN-10	N018	N750A-100	NT-541	5TCU-Q1	
C21	470			SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C22	1500			BPD-0015	D6-152	K071	801-0015	DC-5215	5HK-D15	
C23	.5-3				829-3			CT565A		
C24	470									
C25	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C26	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C27	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C28	1500			BPD-0015	D6-152	K071	801-0015	DC-5215	5HK-D15	
C29	18			SI18	D6-180	TP12	GP1K-180	UC-5418	5GA-Q18	
C30	1500			BPD-0015	D6-152	K071	801-0015	DC-5215	5HK-D15	
C31	22						N150A-220			
C32	1									
C33	5-3				829-3		3115-01-0R5	CT565A		
C34	12						N150A-120			
C35	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C36A	800			BPD-008	DD-801	K069	801-001	DC-521	5GA-T8	
B	800			BPD-008	DD-801	K069	801-001	DC-521	5GA-T8	
C37	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C38	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C39	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C40	100									
C41	470		21R114554	BPD-00047	D6-471	K060	GP2K-471	UC-5347	5GA-T47	
C42	470		21R114554	BPD-00047	D6-471	K060	GP2K-471	UC-5347	5GA-T47	
C43	560		21R120936	SI560	D6-561	TP48	GP2K-561	UC-5356	5GA-T56	
C44	470		21R114554	BPD-00047	D6-471	K060	GP2K-471	UC-5347	5GA-T47	
C45	470		21R114554	BPD-00047	D6-471	K060	GP2K-471	UC-5347	5GA-T47	
C46	.25	200	8R9856	P288-25		PJ2P25		PT4025	2TM-P25	
C47	560		21R120936	SI560	D6-561	TP48	GP2K-561	UC-5356	5GA-T56	
C48	470		21R114554	BPD-00047	D6-471	K060	GP2K-471	UC-5347	5GA-T47	
C49	1500		21R120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C50	22		21R120539				N150A-220			
C51	1500		21R120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C52	470		21R114554	BPD-00047	D6-471	K060	GP2K-471	UC-5347	5GA-T47	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C53	.1	200	8K490310	P288-1	DF-104	PZ2P1		PT401	2TM-P1	
C54	5000		2IR115313	BPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C55	30		2IR410048				N150A-30			
C56	.1	400	8K490236	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C57	470		2IR104554	BPD-00047	D6-471	K060	GP2K-471	UC-5347	5GA-T47	
C58	2.2		2IR115949		TCZ-2.2	Z006	NP0A-2R2		5TCCB-V2R	
C59	18		2IR120578				N150A-180			
C60	5000		2IR115312	BPD-005	DD-502	K060	801-005	DC-535	5HK-D5	
C61	5000		2IR115312	BPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C62	1500		2IR120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C63	1-6		21CT30630		535-5		535-CU-10			
C64	10000		2IR482726	BPD-01	DD-103	K082	811-01	DC-511	5HK-81	
C65	5000		2IR115312	BPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C66	5000		2IR115313	BPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C67	5000		2IR115312	BPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C68	1500		2IR120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C69	1000		2IR118749	811000	D6-102	TP62	GP2L-102	UC-531	5GA-D1	
C70	1000		2IR118749	811000	D6-102	TP62	GP2L-102	UC-531	5GA-D1	
C71	5000		2IR115313	BPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C72	5000		2IR115312	BPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C73	.003	200	8K3830	P288-003	D6-302	CUB6D3	GP2-333-302	PT623	2TM-D3	
C74	.04	600	8K400288	P688-04		CUB684		PT614	6TM-84	
C75	.005	600	8R9869	P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C76	10000		2IR482726	BPD-01	DD-103	K082	811-01	DC-511	5HK-81	
C77	10000		2IR482726	BPD-01	DD-103	K082	811-01	DC-511	5HK-81	
C78	470		2IR115856							
C79	.0047	400	8R490232	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4347	4TM-D47	
C80	220		2IR115905	811220	D6-221	TP59	GP2K-221	UC-5333	5GA-T22	
C81	.047	400	8K490232	P488-047	DF-503	CUB4B47		PT4147	4TM-B47	
C82	.0047	400	8R490232	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4347	4TM-D47	
C83	.0047	400	8R490232	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4347	4TM-D47	
C84	.01	400	8R490236	P488-01	D6-103	CUB4E1	GP2-333-103	PT411	4TM-E1	
C85	.006	600	8R9869	P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C86	.047	400	8K490232	P488-047	DF-503	CUB4B47		PT4147	4TM-B47	
C87	.047	400	8K490233	P488-047	DF-503	CUB4B47		PT4147	4TM-B47	
C88	470		2IR115856	811470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C89	470		2IR115856	811470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C90	1000		2IR118749	811000	D6-102	TP62	GP2L-102	UC-531	5GA-D1	
C91	.0033	600		P688-0033	D6-332	CUB6D33	GP2-333-332	PT6233	6TM-D33	Note 1
C92	.001	1000	8K490268	P1088-001		CUB6D1		PT1621	MB-D1	
C93	.003	600	8R9868	P688-003	D6-302	CUB6D3	GP2-333-302	PT623	6TM-D3	
C94	.01	600	8R9858	P688-01	DD-103	CUB6E1	GP2-333-103	PT611	6TM-81	
C95	100		2IR115900	811100	D6-101	TP39	GP1K-101	UC-531	5GA-T1	
C96	.0047	400	8K490233	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4347	4TM-D47	
C97	390	500	21K116740	1469-0004		5W5T39		MCB-243	MS-34	
C98	680	500	21R114781			5W5T68		MS-37	MS-37	
C99	.089	400	8K490231							
C100	470			811470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	Note 2
C101	5000		2IR115312	BPD-005	DD-502	K080	801-005	DC-535	5HK-D5	
C102	.1	200	8K120675	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C103	180	3000	21R120092	HVD30-180					30GA-T18	
C104	47	3000		HVD30-47			3KV-470		30GA-Q47	

Note 1. Some Models use a .0047MMF in this application.
Note 2. Some Models use a .0000MMF in this application.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1 Meg	½	18A711999	QU-137	AG-61-S	AB-597	U-54	Tone
B	Switch		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
R2A	1500Ω	½	18K730150	* QU-511			UF152R	Contrast - Panel
B	1 Meg	½	Not Req.				UR16-T35 †	Volume tapped at 300K - Rear
C	Switch		Not Req.				US-28	Attach to R2B
R3	5 Meg	½	18K730144	QU-141	AG-85-S	B-87	U-87	Brightness
R4A	5 Meg with 1 Meg Stop	½	18K730221	QU-141	AG-85-S	B-87	U-87	Vert. size-Note 1
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R4A
R5A	50KΩ with 40K Stop	½	18K730148	QU-238	AG-44-S	B-31	U-35	Horiz. Hold - Note 2
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R5A
R6A	750Ω	½	18K730219	QU-105	AG-5-S		U-4	Vert. Linearity
B	Shaft		Not Req.	Not Req.	KSS-3		Not Req.	Attach to R6A
R7A	850KΩ with 200KΩ Stop	½	18K730146	QU-133	AG-61-S	BTSK-72	U-54	Vert. Hold- Note 3
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R7A

Note 1. Connect a 1 MegΩ resistor in series with right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)
Note 2. Connect a 40KΩ resistor in series with right hand terminal of the control and the lead connecting to the same terminal of the original control . (Control viewed from shaft end, terminals down.)
Note 3. Connect a 300KΩ resistor in series with left hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end,terminals down.)
† Universal replacement (Mallory exact duplicate Part No. UE198).
* CONCENTRIKIT EQUIVALENT KIT K-4 BASE ELEMENTS & SHAFTS B17-109 & P10-225 (Panel)
B13-137X & R13-316 (Rear) & SWITCH 76-L

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA MOTOROLA PART No.	IRC PART No.	NOTES
R8	1 Meg	½		BTS-1 Meg	
R9	1 Meg	½		BTS-1 Meg	
R10	56Ω	½		BTS-56	
R11	220Ω	½		BTS-220	
R12	56KΩ	½		BTS-56K	
R13	18KΩ	½		BTS-18K	
R14	2700Ω	½		BTS-2700	
R15	1 Meg	½	6R4004	BTS-1 Meg	
R16	22KΩ	½	6R6397	BTS-22K	
R17	470KΩ	½	6R6032	BTS-470K	
R18	390KΩ	½	6R5646	BTS-390K	Note 3
R19	470KΩ	½	6R6377	BTS-470K	
R20	33000Ω	½	6R8036	BTS-3300	
R21	560Ω	½	6R6281	BTS-560	
R22	1000Ω	½	6R6301	BTS-1000	
R23	4700Ω	½	6R6039	BTS-4700	
R24	100KΩ	½	6R6075	BTS-100K	
R25	330KΩ	½	6R6014	BTS-330K	
R26	4700Ω	½	6R6039	BTS-4700	
R27	15KΩ	½	6R2819	BTS-15K	
R28	1000Ω	½	6R6301	BTS-1000	
R29	1000Ω	½	6R6301	BTS-1000	
R30	10KΩ	½	6R6054	BTS-10K	
R31	6800Ω	½	6R6428	BTS-6800	
R32	47Ω	½	6R5550	BTS-47	
R33	10000Ω	½	6R6301	BTS-1000	
R34	1000Ω	½	6R6301	BTS-1000	
R35	1000Ω	½	6R6301	BTS-1000	
R36	33KΩ	½	6R6410	BTS-33K	
R37	47Ω	½	6R5550	BTS-47	
R38	1000Ω	½	6R6301	BTS-1000	
R39	18KΩ	½	6R6734	BTA-18K	
R40	47KΩ	½	6R5550	BTS-47K	
R41	120Ω	½	6R5551	BTS-120	
R42	1000Ω	½	6R6301	BTS-1000	
R43	1000Ω	½	6R6301	BTS-1000	
R44	1, 6Meg 5%				Note 6
R45	4700Ω	½	6R6080	BTS-4700	
R46	1 Meg	½	6R6004	BTS-1 Meg	
R47	22KΩ	2	6R6398	BTB-22K	
R48	3900Ω	5	17R120400		
R49	22KΩ	½		BTS-22K	Note 1
R50	15KΩ	½		BTS-15K	Note 3
R51	100KΩ	½	6R6075	BTS-100K	
R52	3300Ω	½	6R6581	BTS-3300	
R53	1800Ω	½	6R6089	BTS-1800	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA MOTOROLA PART No.	IRC PART No.	NOTES
R54	100Ω	½	6R6018	BTS-100	
R55	2200Ω	½	6R6390	BTS-2200	
R56	22KΩ	½	6R6397	BTS-22K	
R57	2200Ω	½	6R5933	BTS- 220	
R58	100Ω	½	6R6018	BTS-100	
R59	2200Ω	½	6R6290	BTS-2200	
R60	130Ω	½	6R5551	BTS-130	
R61	33KΩ	½	6R6012	BTS-33K	
R62	15KΩ	½	6R6477	BTS-15K	
R63	68KΩ	½	6R8001	BTS-68K	
R64	1500Ω	½		BTS-1500 ②	
R65	33KΩ	1	6R8400	BTA-33K	
R66	2700Ω	1		BTA-2700	
R67	270KΩ	½	6R8414	BTS-270K	
R68	1. 5Meg 5%	½	6R6460	BTS-1. 5Meg 5%	
R69	1. 2Meg	½	6R5653	BTS-1. 2Meg	
R70	560KΩ	½	6R5697	BTS-560K	
R71	22KΩ	½	6R6397	BTS- 22K	
R72	2200Ω	½	6R8089	BTS-2200	
R73	6800Ω	½	6R6428	BTS-6800	
R74	22KΩ	½	6R6028	BTS- 22K	
R75	2700Ω	½	6R6393	BTS-2700	
R76	10KΩ	½	6R6054	BTS-10K	
R77	100Ω	½	6R6018	BTS-100	
R78	8200Ω	2	6K120579	BTB-8200	
R79	120Ω	½	6R5551	BTS-120	
R80	100KΩ	½	6R6031	BTS-100K	
R81	100KΩ	½	6R6031	BTS-100K	
R82	100KΩ	½	6R6031	BTS-100K	
R83	47Ω	½	17K468266		
R84	22KΩ	½	6R6397	BTS- 22K	
R85	4. 7Meg	½	6R3122	BTS-4. 7Meg	
R86	1000Ω	½		BTS-1000	Note 3
R87	5600Ω	1	6R6217	BTS-5600	
R88	4700Ω	½	6R6080	BTS-4700	
R89	100KΩ	½	6R6075	BTS-100K	
R90	150KΩ	1	6R410053	BTA-150K	
R91	150KΩ	1	6R410053	BTA-150K	
R92	680Ω	½	6R6428	BTS-6800	
R93	330KΩ	½	6R2098	BTS-330K	
R94	470Ω	½	6R488110	BTS-470	
R95	1. 8Ω	½	17K706702		
R96	6. 8Ω	½	6K120580		Note 4
R97	7. 5Ω	5	17A711500		
R98	2700Ω	2		BTB-2700	

Note 1. Some models may use a 10KΩ resistor in this application.
Note 2. Not used in all models.
Note 3. Some models may use a 1200Ω resistor in this application.
Note 4. Used in 502 series only.
Note 5. Some models may use a 1. 5 Meg resistor in this application.

TRANSFORMER (FILAMENT)

ITEM No.	RATING PRI	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA MOTOROLA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordorson PART No.
T1	117VAC ⑥ - 75A	6. 3VAC ⑤ 10. 5A		25B730139	P-6308 ①	A-2946 ①	F-31A ①		F5518 ① ③	T-21F13 ① ②

① Drill new mounting holes.
② Tape 6. 3V center tap.
③ Replacements made for TS-402 chassis.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	MOTOROLA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.
T2	Vert. Osc. Trans.	25B730179	A-8125 ①	A-3003 ①	A-97X ①		B6702 ①
T3	Horiz. Output Trans.	24K730904					
		24C730902 ②					
T4	Vert. Output Trans.	25K730058	A-8140 ④ ⑤	A-3061 ① ⑦	A-103X ① ⑧		Z1805 ④ ⑤
T5A	Yoke - Horiz. (22MH)	24C730633 ③	DY-30A ⑩ ⑪	MDF-74 ⑪	Y-2610 ⑧ ⑪	214D1 ⑫	DF603 ⑩ ⑪ ⑬
B	Yoke - Vert. (3.1MH)	24C730632 ③					
		24C730634 ③					

① Connect blue lead to cathode, red lead to ground , green lead to integrator network, yellow lead to grid.
② Alternate horiz. output trans. used in chassis FTS-502.
③ Alternate vert. output trans.
④ Drill new mounting holes.
⑤ Connect as auto transformer.
⑥ Drill one new mounting hole.
⑦ Use 50 to 1 turns ratio.
⑧ Does not include rear cover or positioning device.
⑨ Alternate yoke.
⑩ Use original vert. deflection coil resistor.
⑪ Connect terminal #1 to either terminal #5 or #6.
⑫ Use original cover and positioning device.
⑬ Use original deflection coil network.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	MOTOROLA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordorson PART No.	NOTES
T6	2.4KΩ	3.2Ω	25K730140	A-3976	A-3928	S-1X	Z1005	T8-24850A	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP	REPLACEMENT DATA MOTOROLA PART No	JENSEN PART No	QUAM PART No	NOTES
SP1A	6	83.5Ω	3.2Ω	50K722077		6E8SS	① Alternate 6" EM speakers
				50C703061 ①			
				50K722079 ①			
				50C710602 ①			
				50C730061 ①			
				50C71976 ①			
				50C484002 ①			
				50C71061 ①			
				50C731262 ①			
				50C70815 ①			
B	6"	PM	3.2Ω	50K730364 ②	ST-108 Mod. P6-X	6A1	② 6" PM speaker used on all table models. Filter choke mounted on speaker
C	8"	85Ω	3.2Ω	50C70336 ③		8E8SS	③ 8" EM speaker used on 17K17 & 21K12A series
				50K703084 ④			④ Alternate 8" EM speaker
D	6 X 9"	85Ω	3.2Ω	50C72167 ⑤		69E8SS	⑤ 6 x 9" EM speaker used on 21K16 series
				50C72535 ⑤			⑥ Alternate 6 x 9" EM speaker
E	10"	85Ω	3.2Ω	50K721296 ⑦		10E8SS	⑦ 10" EM speaker used on 21K13, 21K14, & 21K15 series
				50K72431 ⑧			⑧ Alternate 10" EM speakers
				50K72432 ⑧			
				50K72195 ⑧			

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	UHF Ant. Coupling Loop	0Ω CT		1V730900				Motorola part no. includes R8, R9, C6, C7 and strip
L2	UHF RF Coupling	0Ω		84J730674				
L3	Fil. Choke	0Ω		24K712254				
L4	Fil. Choke	0Ω		24K712254				
L5	Cathode Choke	0Ω		24K721430				
L6	UHF Osc. Coil	0Ω		24J730126				Less tuning core, core part no. 1B730685
L7	RF Choke	1.7Ω		24K712103				
L8	IF Trap	0Ω		24J730713				
L9	FM Trap	0Ω		24K730714				
L10	UHF IF Input Coil	0Ω		24A731036				
L11	Ant. Shunt Coil	.1Ω		24A730616				
L12	Trap Coil	0Ω		24C730823				Low Channel
L13	Trap Coil Interference	0Ω		24K730824				Low Channel
L14	Ant. Coils	0Ω		24K730857				Channels 2 - 7
L15	Ant. Shunt Coils	0Ω		24K730823				Channel 7 - 13
L16	Fil. Choke	0Ω		24K730391				
L17	Neutr. Coil	0Ω		24B721256				
L18	RF Coil	0Ω		24A730609				Channel 13
L19	RF Coils	0Ω		24C730838				Channels 2 - 7
L20	Osc. Coil	0Ω		24A730726				Channel 13
L21	Osc. Coils	0Ω		24K730838				Channel 2 - 7
L22	Conv. Plate	.1Ω		24B730393				
L23	1st. Video IF	.1Ω		24B730392		17-4524 †	6219 ◆	
L24	Fil. Choke	0Ω		24K730392				Not used in all Models
L25	2nd. Video IF	.1Ω	.1Ω	24B730614			6233 ◆	Includes trap
L26	Fil. Choke	0Ω		24K730391		19-1001	6804	1.3 Microhenries
L27	3rd. Video IF	.1Ω	.1Ω	24B730615			6233 ◆	Includes trap
L28	Fil. Choke	0Ω		24K730391		19-1001	6804	1.3 Microhenries
L29	RF Choke	.1Ω		24A730615		19-1001	6804	1.5 Microhenries
L30	4th. Video IF	.1Ω	.1Ω	24B730615				Includes 5.6MMF Cap., (part #21K120169), 4.7MMF Cap. (part #21K38951), IN60 crystal detector, Series peaking coils (part #24K119689)
L31	Series Peaking Coil	7Ω		24K120588		19-4200	6154 ▲	300 Microhenries wound on 12KΩ resistor
L33	Shunt Peaking Coil	8.5Ω		24K119864		19-3250	6181	365 Microhenries
L33	Series Peaking Coil	1.5Ω				19-1004	6810	7.8 Microhenries,not used on all Models
L34	4.5MC Trap	2.2Ω		1V730608		20-1004	TV-151	1470
L35	Series Peaking Coil	8Ω		24K120964		19-3250 †	TV-185 †	340 Microhenries, wound on 10KΩ resistor
L36	Shunt Peaking Coil	7Ω		24K119850		19-3150	TV-184	6180	187 Microhenries
L37	Shunt Peaking Coil	18Ω		24K721271		19-3500 ◆	TV-188 ◆	6174 ◆	450 Microhenries, wound on 1200Ω resistor
L38	Sound IF	2.3Ω				20-1005	TV-181	1469	
L39	Fil. Choke	2.8Ω		24B730878		19-7047		4628	69 Microhenries
L40	Ratio Det.	2.7Ω	.4ΩCT	24B702543		17-1053 ■	TV-110 ■	1608 ■	Tertiary winding-.3Ω
L41	Horiz. Osc.	42Ω		24K701558		19-1576 ▲	TV-163 ▲	6210 ▲	

† Use winding with 56KΩ shunt resistor.
* Use one winding only.
◆ Use adaptor plate.
■ Drill mounting hole.
▲ Drill mounting hole for clip diameter
♣ Parallel with 12KΩ resistor
§ Parallel with 10KΩ resistor
# Parallel with 1200Ω resistor

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE @ CURRENT 1000 ~	MOTOROLA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L42	. 220A	85Ω		25B730204 ①					

① Used with PM speakers only.

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT	MOTOROLA PART No.	SELETRON PART No.	FEDERAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	
M1	. 220A	48B700555	6Q4	1090A	6S300	300	
M2	. 220A	48B700555	6Q4	1090A	6S300	300	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M3			1" piece of # 26 wire					

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		MOTOROLA PART No.	SYLVANIA PART No.		
M4		48K731312 or 48K731313 or 48K731314	1N82 or A		UHF mixer (clip mounting)
M5	1N60	48C711052 or 48K711077 or 48K722720 or 48K712199	1N60		Video detector (pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M6	Dial light	65X10867	# 47 bayonet
M7	Tuner		UHF TT-37 (used in Y chassis only)
M8A	Tuner	1U730825	VHF TT53 (used in chassis TS402, TS502, VTS502, WTS502)
B	Tuner	LU731299	VHF TT53Y(used in chassis TS402Y, TS502Y, VTS502Y, WTS502Y)
C	Tuner	1U730939	VHF TT61 (used in chassis VTS402, TTS502)
D	Tuner	1U731301	VHF TT61Y (used in chassis VTS402Y, TTS502Y)
M9	Switch	40A730389	Area selector (AGC)
M10	Centering magnet	48A721145	
M11	Ion trap	24K711843	
M12A	Correction magnet	48B721914 or 48B720968	Right hand
B	Correction magnet	48K721915 or 48K720969	Left hand
	Cabinet	16F730723	Console-red-brown mahog. models 17K17 & Y17K17
	Cabinet	16K730724	Console-limed oak models 17K17B & Y17K17B
	Cabinet	16K730172	Table-red-brown mahog. plastic 17T15A & Y17T15A
	Cabinet	16E730378	Table-red-brown mahog. 17T16 & Y17T16
	Cabinet	16K730379	Table-limed oak 17T16B & Y17T16B
	Cabinet	16K730605	Table-red-brn mahog. with legs 21C2 & Y21C2
	Cabinet	16K730606	Table-limed oak with legs 21C2B & Y21C2B
	Cabinet	16K730930	Console-red-brown mahog. 21K12A & Y21K12A
	Cabinet	16K730931	Console-limed oak 21K12AB & Y21K12AB
	Cabinet	16F730382	Console-red-brown mahog. 21K13 & Y21K13
	Cabinet	16K730383	Console-limed oak 21K13B & Y21K13B
	Cabinet	16F730635	Console-red, brown mahog. 21K14 & Y21K14
	Cabinet	16K730636	Console-limed oak 21K14B & Y21K14B
	Cabinet	16F730796	Console- walnut 21K15 & Y21K15
	Cabinet	16F730792	Console-white birch-models 21K16 & Y21K16
	Cabinet	16F730829	Console-white birch-models 21K17 & Y21K17
	Cabinet	16K730200	Table-molded plastic models 21T8A & Y21T8A
	Knob	36K730174	Channel selector VHF models
	Knob	36B730171	VHF chan. selector UHF models (Y prefix)
	Knob	36B730158	(2) fine tuning and off-on volume
	Knob	36C730162	Contrast
	Knob	36C730167	Tone
	Knob	36B712294	Area selector
	Knob	36B730229	(3) horizontal, vertical and brightness
	Dial scale	34C730165	UHF indicator for "Y" models only
	Safety glass	61K730370	All 17K17 and 17K16 models
	Safety glass	61D720245	17T15 models
	Safety glass	61K730274	All 21C2, 21K12,21K14, 21K15, 21K16 and 21K17 models
	Safety glass	61K730656	21T8 models

TROUBLE SHOOTING AIDS (cont)

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POWER

DEAD SET

If filaments fail to light, check fuse M3, A.C. interlock assembly, switch on volume control and T1. If filaments light, check M1, M2, C1, C2A and other associated B+ filter components.

SMALL AND/OR DIM PICTURE

Measure B+ at 270 volt point.

If Satisfactory	If Unsatisfactory
Follow procedure outlined under horizontal "Insufficient Sweep".	Check M1, M2 and other associated B+ filter and decoupling components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V15, V16, V17 and V18. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check T3, T5A, R95 and other associated components.	Check C97, C98, C101, R89, R93 and other components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V15, V16, V17 and V18. Measure B+.

If Satisfactory	If Unsatisfactory
See "Loss of High Voltage".	See "Small and/or Dim Picture".

BLOOMING

Substitute V15, V16, V17 and V18. Check R95, T3, T5A, picture tube and other associated components

GENERAL

RASTER SOUND NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER PICTURE NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER NO PICTURE NO SOUND

Check by substitution V2, V3, V4, V5, and V6. Check associated components. Check audio detector crystal and assembly. In case of UHF check V1.

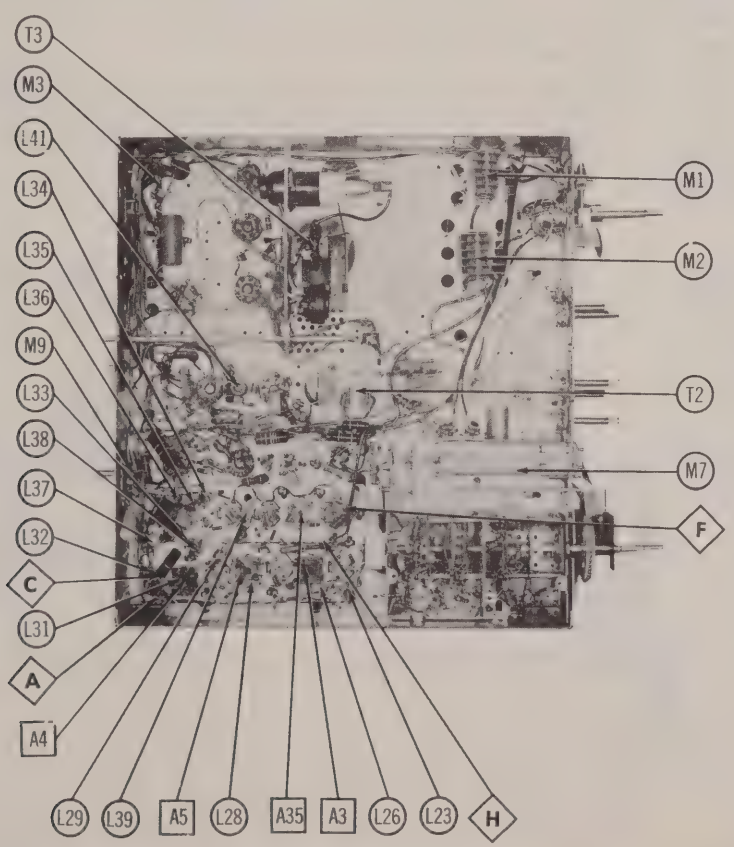
NO RASTER NO SOUND

Follow procedure outlined under "Dead Set".

INTERMITTENT STREAKS

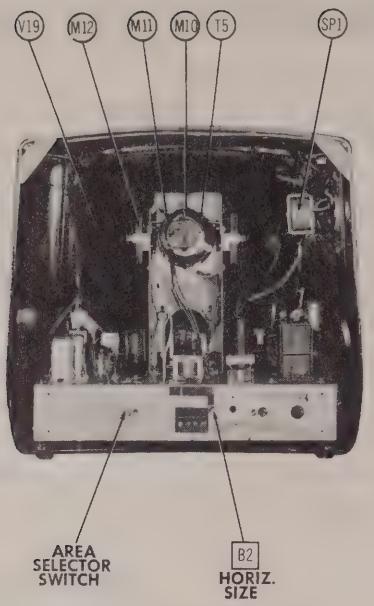
Check video signal for interference pulses. Check high voltage section for corona discharge and arcing .

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

MOTOROLA MODELS 17K17, B, 17T15A, AE, 17T16, B, 21C2, B, 21F5, B, 21K12A, AB, WA. 21K13, B, 21K14, B, 21K15, 21K16, W, 21K17, 21T8A, AE, 21T11, B, W, Y17K17, B, Y17T15A, AE, Y17T16, B, Y21C2, B, Y21F5, B, Y21K12A, AB, WA, Y21K13, B, Y21K14, B, Y21K15, Y21K16, W, Y21K17, Y21T8A, AE,Y21T11, B, W



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

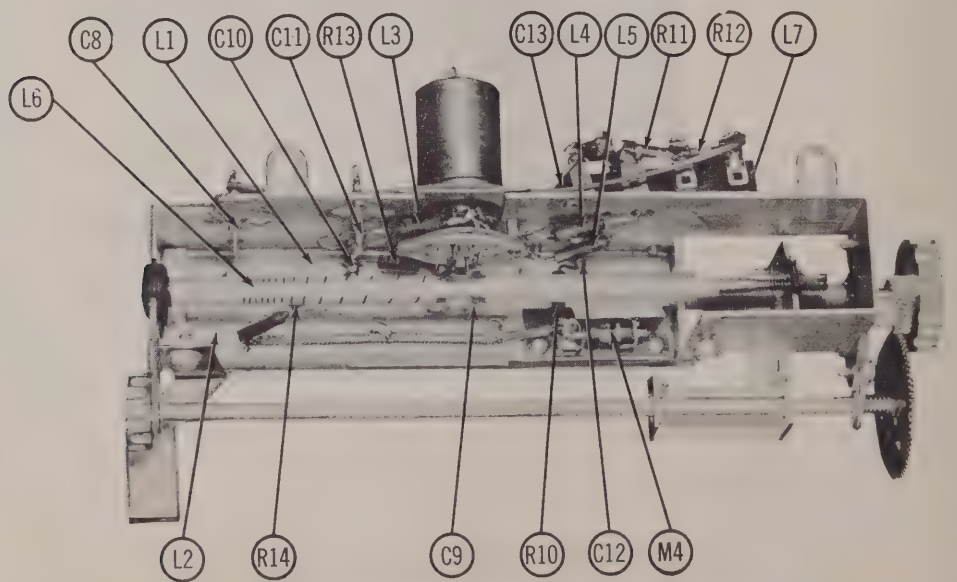
Normally the horizontal hold control will have a sync range of approximately 30 degrees. If the controls is too critical adjust as follows:

1. Shunt the horizontal oscillator coil (L41) to ground with a .25MFD, 400 volt capacitor. This may be done with the chassis in the cabinet by placing the capacitor across the 2 pin receptacle on rear of chassis.

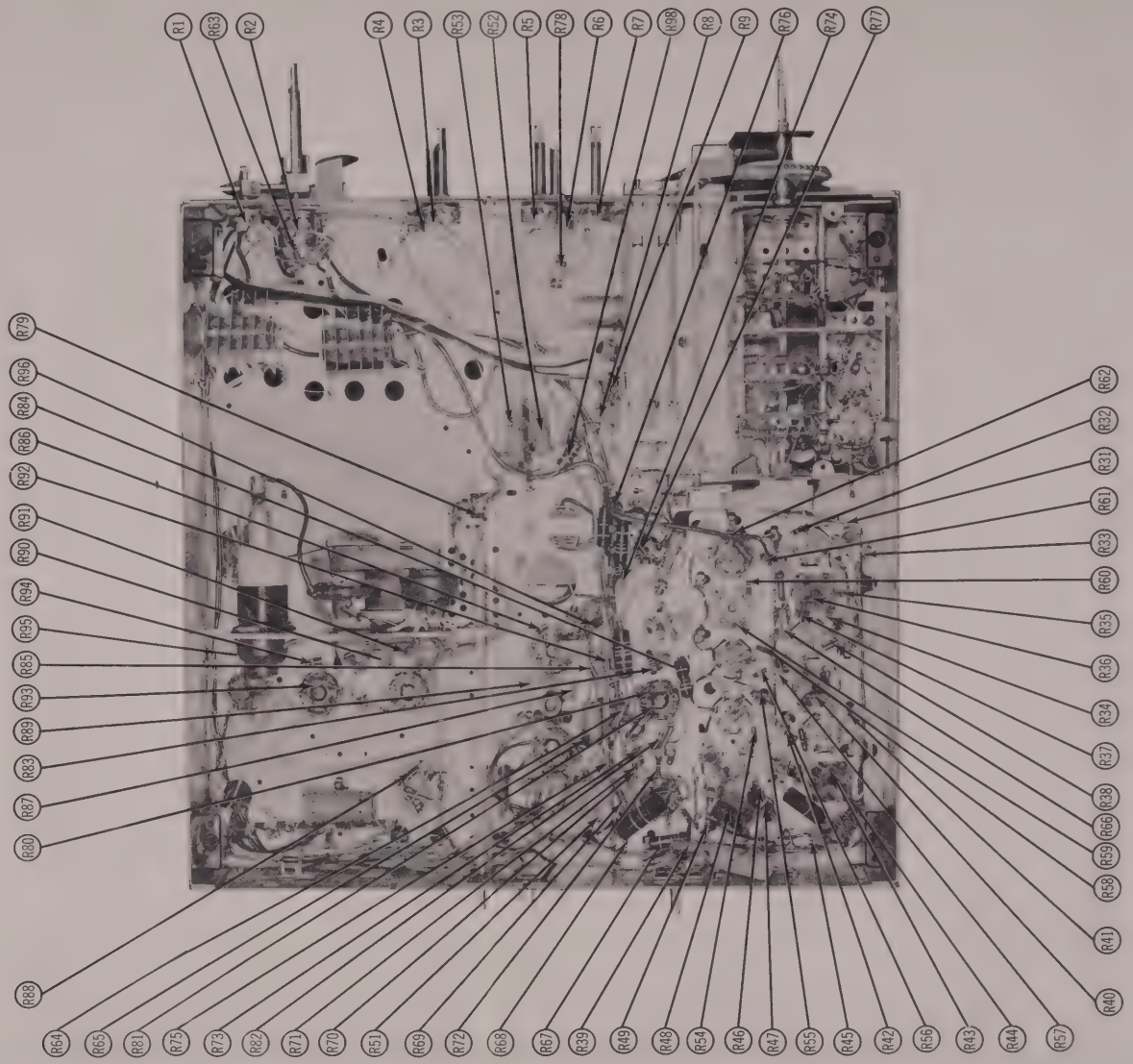
2. With the horizontal centering lever move the picture to the right so the left edge of the raster can be seen. Adjust the horizontal hold control until no blanking pulse appears and the picture just starts to fold on the left (the blanking pulse is the gray bar just to the left edge of the raster). It may be necessary to adjust the contrast and brightness controls to make the pulse visible.

3. Remove the .25MFD capacitor across L41.

4. Adjust the horizontal oscillator coil slug (B1) until no sync pulse can be seen as in step 2. Recenter picture. Adjust the horizontal size adjustment (B2) for a picture slightly wider than necessary to fill the picture mask horizontally. Since this adjustment also affects the vertical size it may be necessary to adjust the vertical size control.



UHF TUNER



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CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustment of RF tuner oscillator adjustments, it is necessary to remove the chassis from the cabinet. (See disassembly instructions).

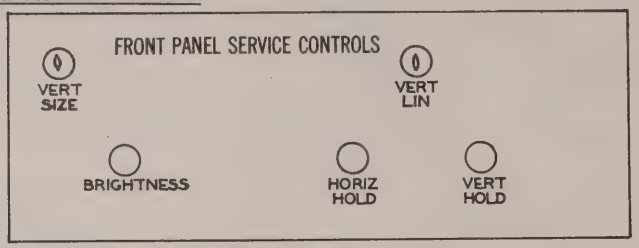
PICTURE TUBE SAFETY GLASS CLEANING

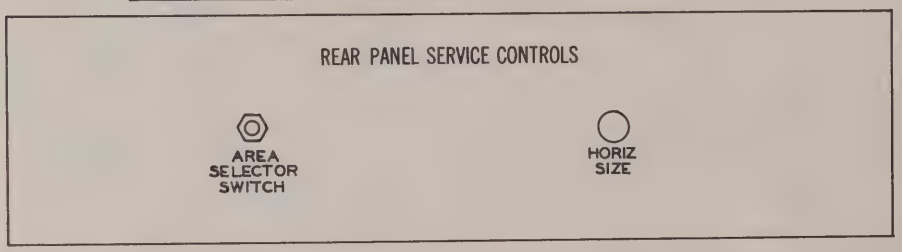
For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION





HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal oscillator slug (L41) until picture synchronizes horizontally. (For location see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary located on bottom of chassis. (See tube placement chart). Removal of chassis is necessary to adjust.

FUSES

Two fuses are used. One fuseable resistor is used for LV power supply protection and one 1" piece of #26 wire-filament transformer protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

ANTI-PIN CUSHION ADJUSTMENT

Reduce raster size so that the corners are visible. Change the position of the corrector magnets until the sides of the raster are straight and parallel with the corners becoming right angles.

DISASSEMBLY INSTRUCTIONS

1. Remove 8 push on type control knobs from front panel.
2. Disconnect transmission lines and built-in antenna.
3. Remove 1 push on type control knob from rear cover.
4. Remove 5 metal screws. Remove rear cover.
5. Disconnect speaker plug.
6. Remove 4 chassis bolts. Remove chassis.
7. Remove 4 speaker nuts. Remove speaker.

PHOTOFACT* Folder

RETMA MEMBER

RAYTHEON MODELS UC-2403A, UC-2404A, UC-2405A, UC-2406A (Ch. 24T2)

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MODEL UC-2403A

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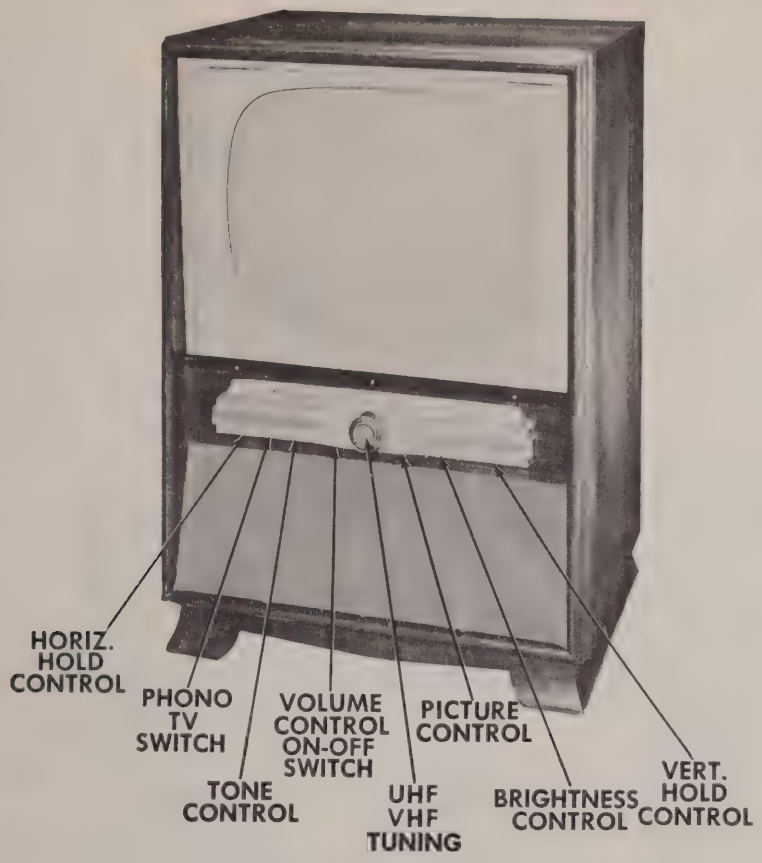

RAYTHEON MODEL UC-2403A

TRADE NAME	Raytheon Models UC-2403A, UC-2404A, UC-2405A, UC-2406A (Ch. 24T2)
MANUFACTURER	Raytheon Manufacturing Co., Television & Radio Division, 5921 W. Dickens Ave., Chicago 39, Ill.
TYPE SET	Television Receiver
TUBES	Twenty-four
POWER SUPPLY	105-115 Volts AC-60 cycle RATING .77 Amp. @ 115 Volts AC
TUNING RANGE—	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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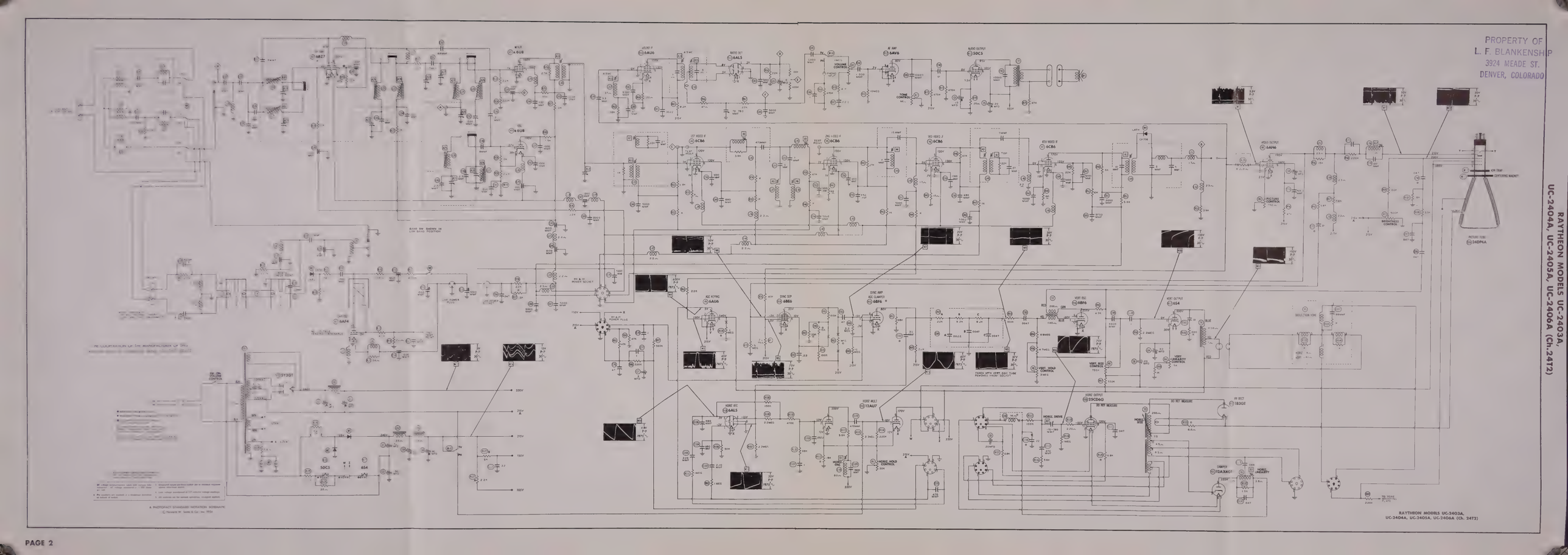
RAYTHEON MODELS UC-2403A, UC-2404A, UC-2405A, UC-2406A (Ch. 24T2)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RAYTHEON MODELS UC-2403A, UC-2404A, UC-2405A, UC-2406A (Ch. 2412)
RAYTHEON MODELS UC-2403A, UC-2404A, UC-2405A, UC-2406A (Ch. 2412)
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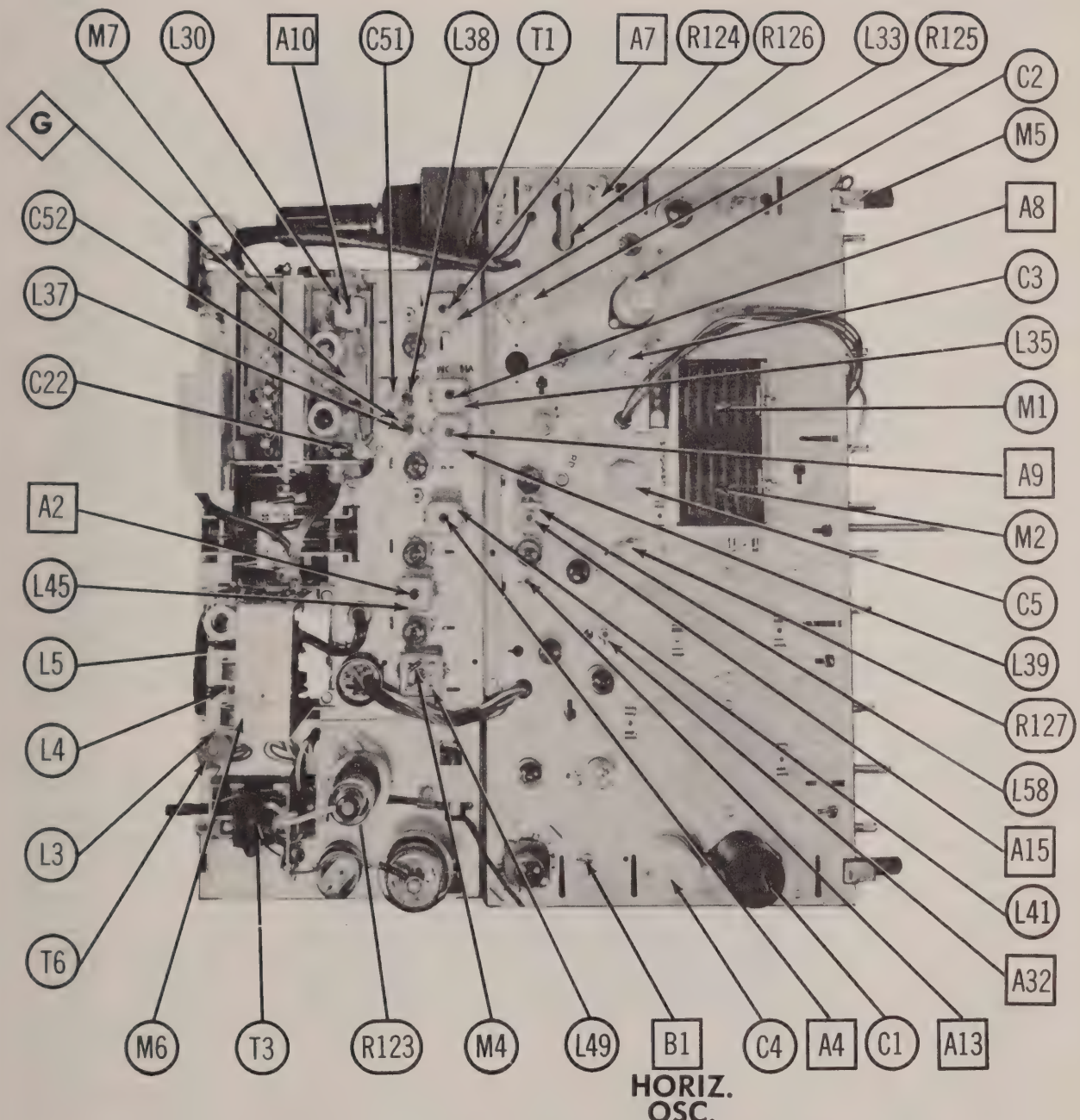
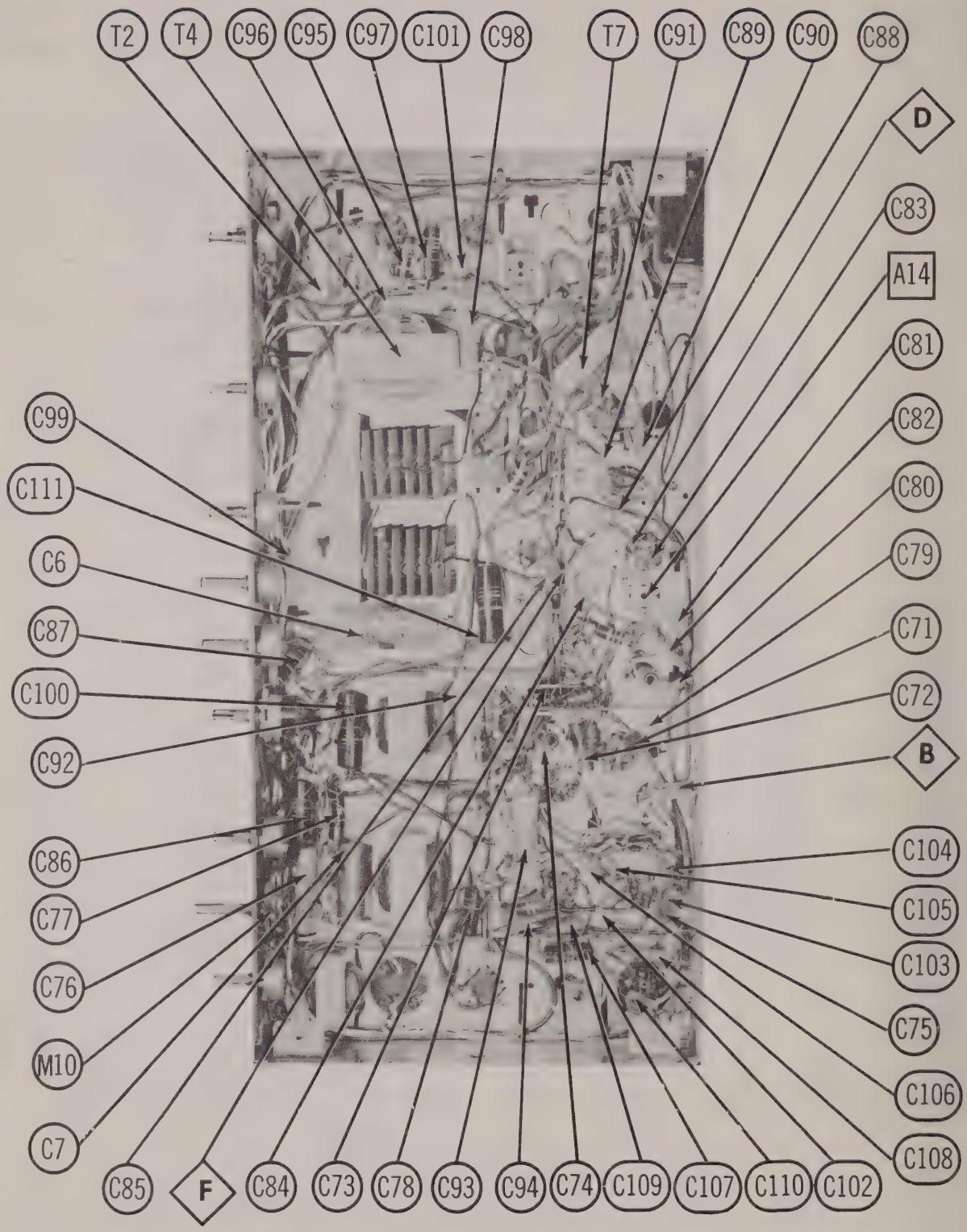


CHASSIS TOP VIEW



DEFLECTION CHASSIS BOTTOM VIEW – CAPACITOR & ALIGNMENT IDENT.

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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal multivibrator tube (V17) to disable the high voltage.
Allow at least a 5 minute warm-up period for receiver and test equipment.
Use an isolation transformer to protect the test equipment.

VIDEO IF ALIGNMENT

Couple generator to alignment points (A) and (C) thru alignment plug (Fig. 1).
In adjusting A2, A3, A7 and A11, two peaks may be obtained. The correct peak occurs with the core furtherest out of coil form.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to point (A). Low side to chassis.	Not used	43.7MC (Unmod)	7 (Approx.)	Use VTVM. DC probe thru 10KΩ to point (B). Common to chassis.	A1	Adjust for maximum deflection. Attenuate generator to maintain approximately 2 volts at VTVM.
2.	"	"	"	41.4MC	"	"	A2	Adjust for MINIMUM deflection.
3.	"	"	"	45.15MC	"	"	A3	Adjust for maximum deflection. Attenuate generator to maintain approximately 2 volts at VTVM.
4.	"	"	"	42.1MC	"	"	A4	"
5.	"	"	"	41.25MC	"	"	A5	Adjust for MINIMUM deflection.
6.	"	"	"	47.25MC	"	"	A6	"
7.	"	"	"	41.4MC	"	"	A7	"
8.	"	High side to point (C). Low side to chassis.	44MC (10MC Swp)	42.0MC 46.0MC	"	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A8, A9	Adjust for maximum amplitude and proper bandwidth similar to Fig. 2. Attenuate generator to maintain 2 volts peak to peak on scope.
9.	"	High side to point (A). Low side to chassis.	"	42.0MC 45.6MC	"	"	A10, A11 A12	Adjust for maximum amplitude and proper bandwidth similar to Fig. 3. Attenuate generator to maintain 2 volts peak to peak.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (D) to chassis. The junction of these two resistors is alignment point (E) as shown on the schematic.
Short antenna terminals to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	.001MFD	High side to point (B). Low side to chassis.	4.5MC (Unmod.)	Any non-interfering channel	DC probe to point (D). Common to chassis.	A13, A14	Adjust for maximum deflection.
11.	"	"	"	"	DC probe to point (F). Common to point (E).	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

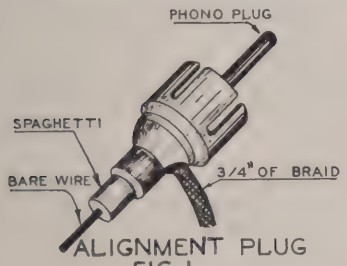
SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Short antenna terminals to chassis.
Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	.001MFD	High side to point (B). Low side to chassis.	4.5MC (450KC swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point (D). Low side to chassis.	A13 A14	Disconnect stabilizing capacitor C4C. Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
11.	"	"	"	"	"	Vert. Amp. to point (F). Low side to chassis.	A15	Reconnect stabilizing capacitor C4C. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 5. SLIGHTLY retouch A14 for maximum amplitude and straightness of crossover lines.

TUNER ALIGNMENT

Preset the trimmer screws (A16 thru A23) as in Fig. 5.
Set the tuner treadle bar to the top of its stroke in low band position (cores furtherest out of coil form).
Adjust A26 thru A31 so that cores are 1½" from end of coil form.
Adjust A24 and A25 so that the cores are 1 5/8" from end of coil form.



ALIGNMENT PLUG
FIG.1

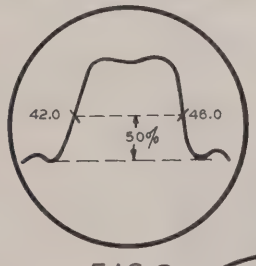


FIG.2

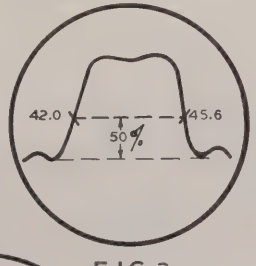


FIG.3

FIG.4

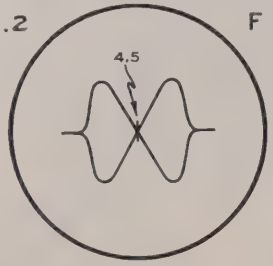


FIG. 5

SET 237 FOLDER 9

RAYTHEON MODELS UC-2403A, UC-2404A, UC-2405A, UC-2406A (Ch. 24T2)

ALIGNMENT INSTRUCTIONS (cont)

LOW BAND RF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	85MC (15MC Swp)	83.25MC 87.75MC	6	Vert. Amp. to point (G). Low side to chassis.	A16, A17, A18	Adjust for maximum gain and response similar to Fig. 7. Adjust A18 for maximum gain between markers.
13.	"	"	85MC (10MC Swp)	83.25MC	6 (See Remarks)	Vert. Amp. to point (B). Low side to chassis.	A19	Rotate tuning control until bottom of treadle bar is 1 3/4" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8.
14.	"	"	85MC (15MC Swp)	83.25MC 87.75MC	"	Vert. Amp. to point (G). Low side to chassis.	A16, A17	Readjust for maximum gain and flat topped response similar to Fig. 7.
15.	"	"	57MC (10MC Swp)	55.25MC	2 (See Remarks)	Vert. Amp. to point (B). Low side to chassis.	A24	Rotate tuning control until bottom of treadle bar is 1 1/8" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8. Repeat step 13.
16.	Direct	High side to point (H): Low side to tuner chassis	43MC (10MC Swp)	42.0MC 45.5MC	(See Remarks)	"	A18	Rotate tuning control until bottom of treadle bar is 5/8" from top of tuner chassis. Check overall IF response curve similar to Fig. 9. If necessary, retouch A18 to obtain desired response.
17.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	79MC (10MC Swp)	77.25MC 81.75MC	5	"		Check each low band channel for response similar to Fig. 10.
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

HIGH BAND RF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
18.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (15MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point (G). Low side to chassis.	A20, A22, A23	Adjust for maximum gain and flat topped response curve similar to Fig. 7. Adjust A23 for maximum gain between markers.
19.	"	"	213MC (10MC Swp)	211.25MC	13 (See Remarks)	Vert. Amp. to point (B). Low side to chassis.	A21	Rotate tuning control until bottom of treadle bar is 1 3/4" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8.
20.	"	"	213MC (15MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point (G). Low side to chassis.	A20, A22	Readjust for maximum gain and flat topped response similar to Fig. 7.
21.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7 (See Remarks)	Vert. Amp. to point (B). Low side to chassis.	A25	Rotate tuning control until bottom of treadle bar is 7/8" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8. Repeat step 19.
22.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"		Check each high band channel for response similar to Fig. 10.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			

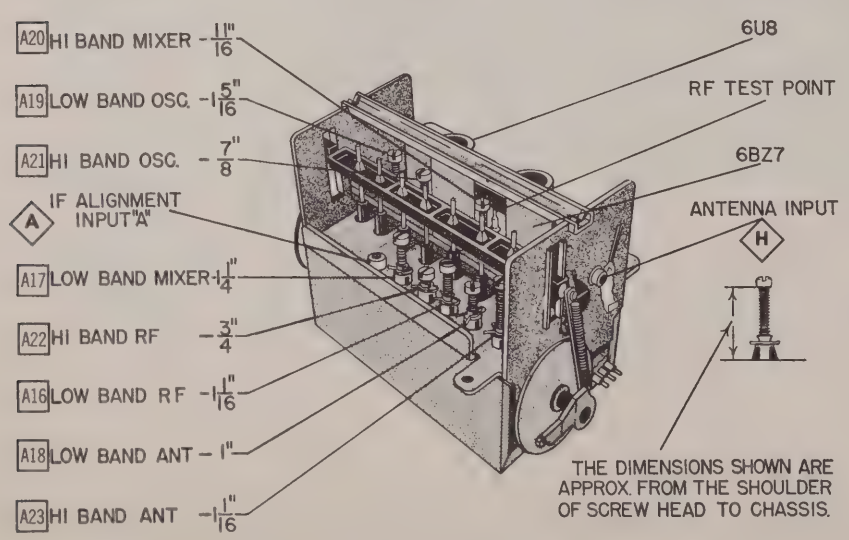

A20 HI BAND MIXER - 1 1/16"
A19 LOW BAND OSC. - 1 5/16"
A21 HI BAND OSC. - 7/8"
A IF ALIGNMENT INPUT "A"
A17 LOW BAND MIXER - 1 1/4"
A22 HI BAND RF - 3/4"
A16 LOW BAND RF - 1 1/16"
A18 LOW BAND ANT - 1"
A23 HI BAND ANT - 1 1/16"
6U8
RF TEST POINT
6BZ7
ANTENNA INPUT
H
THE DIMENSIONS SHOWN ARE APPROX. FROM THE SHOULDER OF SCREW HEAD TO CHASSIS.

FIG. 6

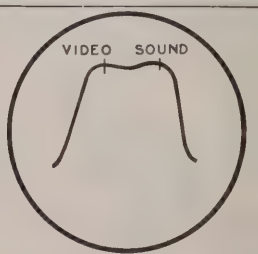


FIG.7

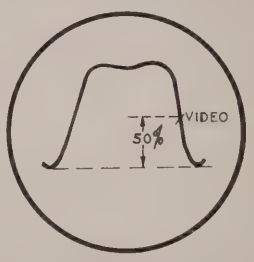


FIG.8

PROPERTY OF
L. F. [illegible]
[illegible] AVENUE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS (cont)

4.5MC TRAP ALIGNMENT

Tune in a TV station and adjust the tuning control until sound bars just appear in the picture.
Starting with A32 all the way out adjust clockwise for minimum sound bars in picture.

UHF TUNER ALIGNMENT

Do not remove UHF tuner from chassis.
Check to see that 6AF4 (V1) is firmly seated in its socket and the shield clip is seated in the tube shield notch.
Check oscillator grid current by connecting a multimeter across R14 (22 Ω). A reading of 10 to 30 microamperes should be obtained if oscillator is functioning normally.
Both the oscillator and crystal detector may be checked by placing the multimeter across R10 (22Ω). A reading of 5 to 40 microamperes indicates oscillator and crystal are functioning normally.

MECHANICAL ALIGNMENT OF RF AND MIXER RIBBONS

1. Remove spring and connecting bar on UHF tuner coupling arm.
2. Rotate UHF tuner coupling arm to its counter clockwise stop.
3. The RF and mixer ribbons should be 4 7/8" as indicated in Fig. 11.
4. If the ribbons are not 4 7/8" as indicated, loosen pulley positioning screw slightly and reposition by turning drive pulleys.
5. Replace spring and connecting bar on UHF tuner coupling arm.

UHF ALIGNMENT

Connect the negative lead of a 6 volt battery to pin 8 of the RF power socket. Connect position lead to chassis. Adjustment of tracking screws must be made from crystal side of tuner and in sequence from 1 thru 10.
To perform step 33 it may be necessary to remove the spring and connecting bar on the UHF tuner coupling arm and turn the UHF tuner coupling arm clockwise.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
23.	Two 120Ω Carbon Resistors	Across UHF antenna terminals with 120Ω in each lead.	990MC (10MC Swp)	895MC	(See Remarks)	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.		Loosely couple marker generator to sweep generator leads. Loosen the two oscillator cavity screws and rotate oscillator. Adjustment (See Fig. 11) to obtain response curve similar to Fig. 12 with 895MC marker falling at 50%. Set RF and mixer ribbons to 4 3/4" as indicated in Fig. 11.
24.	"	"	865MC (10MC Swp)	870.5MC	"	"	Tracking screws (Pair #1)	Set ribbons to 4 5/8" as indicated in Fig. 11. Adjust for response similar to Fig. 12.
25.	"	"	775MC (10MC Swp)	780.5MC	"	"	Tracking screws (Pair #2)	Set ribbons to 4 3/16". Adjust for response similar to Fig. 12.
26.	"	"	726MC (10MC Swp)	731MC	"	"	Tracking Screws (Pair #3)	Set ribbons to 3 7/8". Adjust for response similar to Fig. 12.
27.	"	"	671MC (10MC Swp)	676MC	"	"	Tracking Screws (Pair #4)	Set ribbons to 3 7/16". Adjust for response similar to Fig. 12.
28.	"	"	624MC (10MC Swp)	629.5MC	"	"	Tracking Screws (Pair #5)	Set ribbons to 3 1/8". Adjust for response similar to Fig. 12.
29.	"	"	585MC (10MC Swp)	590MC	"	"	Tracking Screws (Pair #6)	Set ribbons to 2 3/4". Adjust for response similar to Fig. 12.
30.	"	"	545MC (10MC Swp)	550MC	"	"	Tracking Screws (Pair #7)	Set ribbons to 2 7/16". Adjust for response similar to Fig. 12.
31.	"	"	507MC (10MC Swp)	512MC	"	"	Tracking Screws (Part #8)	Set ribbons to 2 1/16". Adjust for response similar to Fig. 12.
32.	"	"	478MC (10MC Swp)	483.5MC	"	"	Tracking Screws (Pair #9)	Set ribbons to 1 11/16". Adjust for response similar to Fig. 12.
33.	"	"	455MC (10MC Swp)	460MC	"	"	Tracking Screws (Pair #10)	Set ribbons to 1 3/8". Adjust for response similar to Fig. 12.

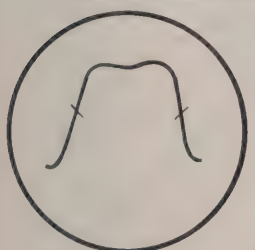


FIG.9

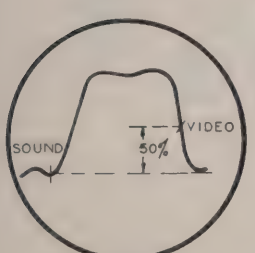


FIG.10

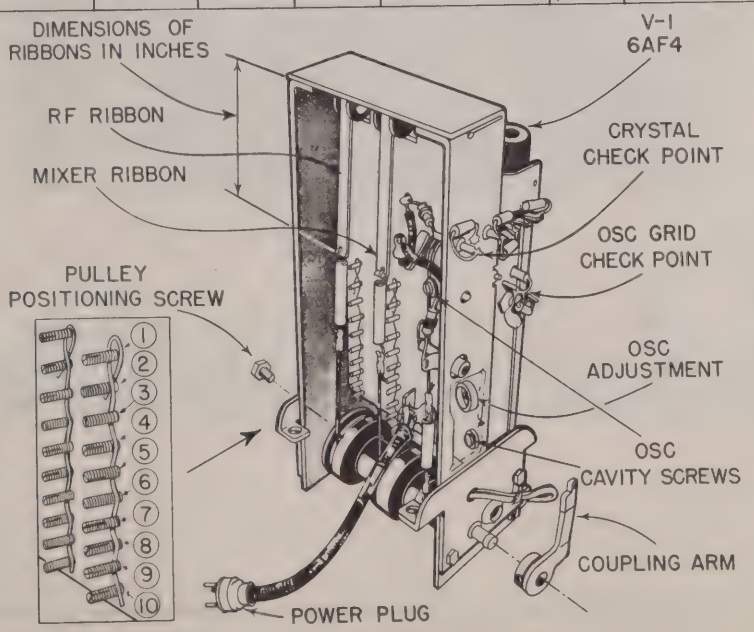


FIG.11

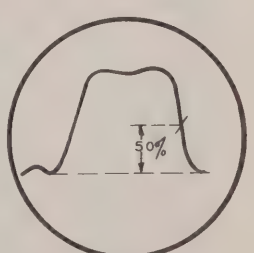
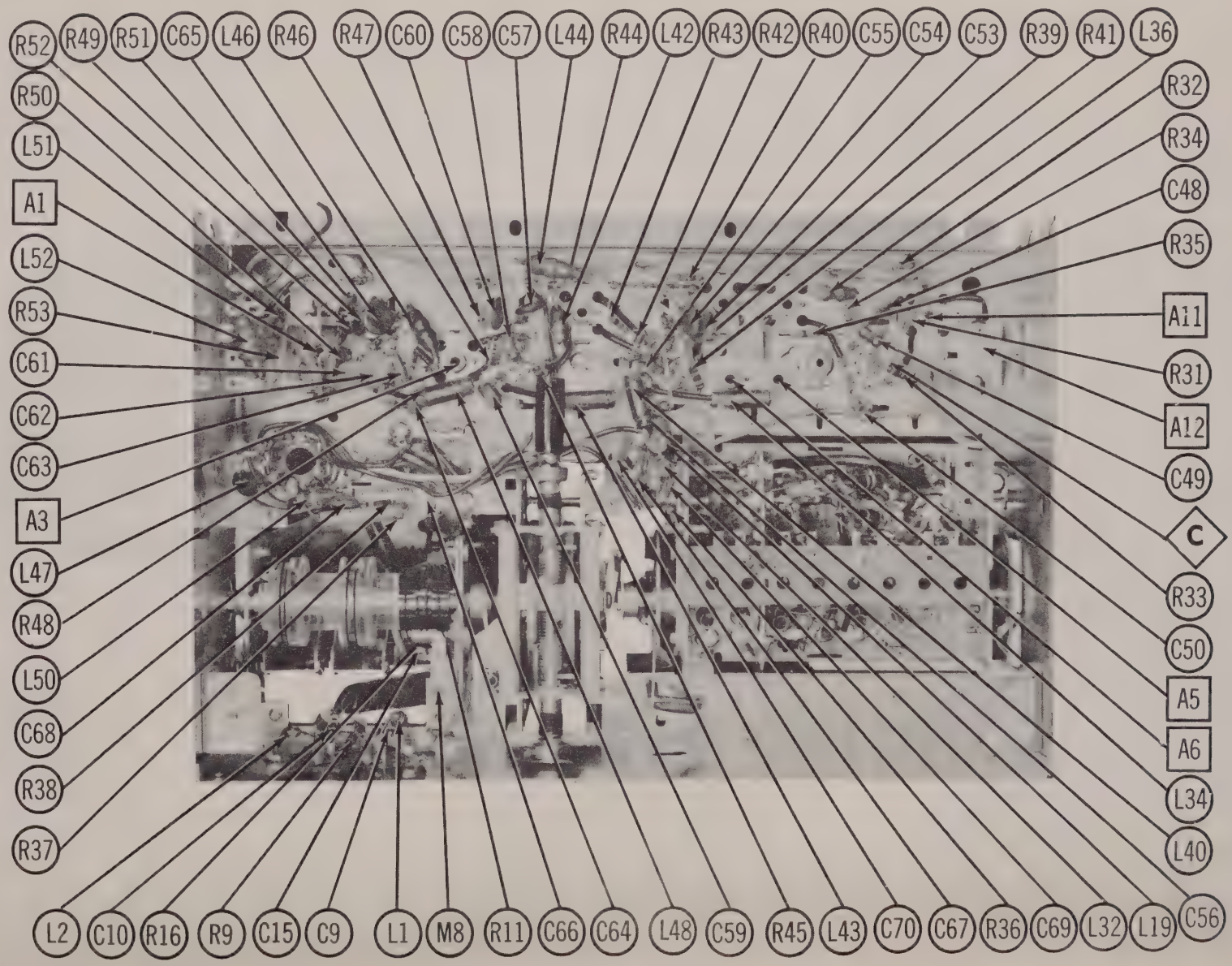


FIG.12

RAYTHEON MODELS UC-2403A, UC-2404A, UC-2405A, UC-2406A (Ch. 24T2)

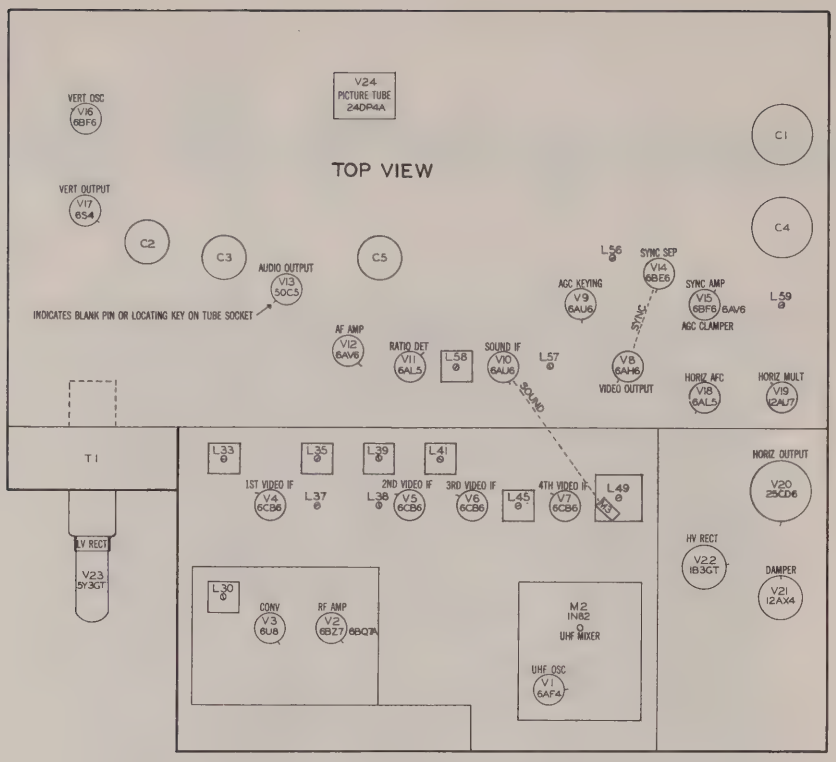


RF-IF CHASSIS-BOTTOM VIEW

PROPERTY OF
L. F. BLANKENSHIP
3974 MEADE ST.
DENVER, COLORADO

VHF TUNER-BOTTOM VIEW

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V23 Selenium Rectifiers (M1 & M2)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7 (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V8, V24
Has pic, no sound - V10, V11, V12, V13
Overloaded picture - V9, 15

SYNC FAILURE
No vert. sync -V15, V16
No horiz. sync - V15, V18, V19
No vert. or horiz. sync - V14, V15

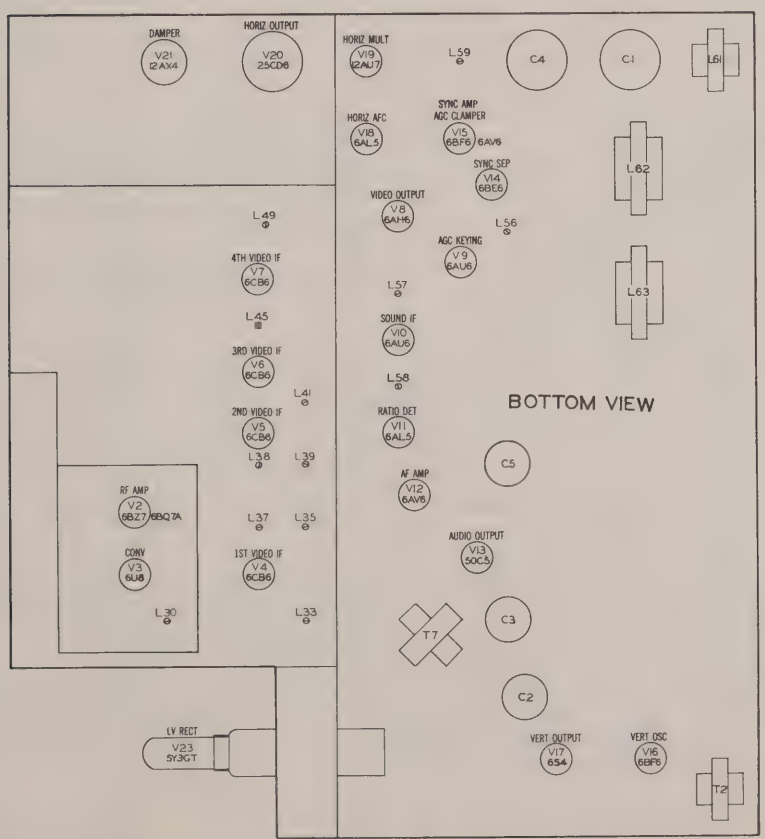
SWEEP FAILURE
No raster, has sound - V19, V20, V21, V22, V24
No vertical deflection - V16, V17
Poor vert. linearity or foldover -V16, V17
Poor horiz. linearity or foldover - V19, V20, V21
Narrow picture - V19, V20, V21, V22, V23, M1, M2
Vert. off freq. - V15, V16
Horiz. off freq. -V15, V18, V19

RESISTANCE MEASUREMENTS

PROPERTY OF
L. F. BLANKENSHIP
3824 MEADE ST.
DENVER, COLORADO

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	†■8.3KΩ	4.7KΩ	.1Ω	0Ω	0Ω	4.7KΩ	†■8.3KΩ		
V 2	6BZ7	INF	850KΩ	0Ω	.1Ω	0Ω	†1.1KΩ	INF	INF	0Ω
V 3	6U8	†1.6KΩ	240KΩ	†43KΩ	.1Ω	0Ω	†10KΩ	0Ω	2.2KΩ	12.2KΩ
V 4	6CB6	100KΩ	82Ω	0Ω	.1Ω	†3.6KΩ	†2.6KΩ	0Ω		
V 5	6CB6	140KΩ	68Ω	0Ω	.1Ω	†2.6KΩ	†2.6KΩ	0Ω		
V 6	6CB6	48KΩ	47Ω	0Ω	.1Ω	†2.6KΩ	†2.6KΩ	0Ω		
V 7	6CB6	2Ω	180Ω	.1Ω	0Ω	†5.7KΩ	†10KΩ	0Ω		
V 8	6AH6	4.1KΩ	0Ω	0Ω	.1Ω	†5.7KΩ	†47KΩ	450Ω		
V 9	6AU6	†28KΩ	†70Ω	†70Ω	†70Ω	320KΩ	▲6.8KΩ	†70Ω		
V 10	6AU6	100KΩ	0Ω	0Ω	.1Ω	†8.2KΩ	†8.2KΩ	120Ω		
V 11	6AL5	22KΩ	0Ω	.1Ω	0Ω	INF	0Ω	INF		
V 12	6AV6	10Meg	0Ω	0Ω	.1Ω	0Ω	0Ω	†470KΩ		
V 13	50C5	120Ω	470KΩ	♦22Ω	♦11Ω	470KΩ	†2.3KΩ	†2.5KΩ		
V 14	6BE6	50KΩ	0Ω	0Ω	.1Ω	†140KΩ	†35KΩ	1.5Meg		
V 15	6AV6	†3.3Meg	0Ω	0Ω	.1Ω	†8.5Meg	†8.5Meg	†22KΩ		
V 16	6BF6	8Meg	0Ω	0Ω	.1Ω	INF	INF	▲700KΩ		
V 17	6S4	INF	2.3KΩ	2.2Meg	♦0Ω	♦5Ω	2.2Meg	INF	INF	▲8KΩ
V 18	6AL5	150KΩ	2.2Meg	0Ω	.1Ω	4.5Meg	0Ω	2.2Meg		
V 19	12AU6	#5.8KΩ	4.8Meg	1.8KΩ	0Ω	0Ω	#150KΩ	280KΩ	1.8KΩ	.1Ω
V 20	25CD6G	INF	♦8Ω	0Ω	†124Ω	1Meg	†105Ω	♦5Ω	†6.8KΩ	TOP CAP ▲7.5Ω
V 21	12AX4GT	▲13Ω	INF	300KΩ	INF	#124Ω	INF	♦11Ω	♦8Ω	
V 22	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲290Ω
V 23	5Y3GT	INF	100KΩ	INF	17KΩ	INF	17KΩ	INF	100KΩ	
V 24	24DP4A	†70Ω	†450KΩ	PIN 6 ▲330KΩ	PIN 10 ▲330KΩ	PIN 11 †226KΩ	PIN 12 †70Ω			

■ MEASURED IN UHF POSITION
† MEASURED FROM OUTPUT OF M1
# MEASURED FROM PIN 8 OF V23
▲ MEASURED FROM PIN 3 OF V21
♦ MEASURED FROM COLD SIDE OF OFF/ON SWITCH



TUBE PLACEMENT CHART

SET 237 FOLDER 9

TROUBLE SHOOTING AIDS

CAUTION

Use a line isolation transformer when servicing this receiver to remove shock hazard and prevent damage to receiver and/or test equipment.

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage.

INSUFFICIENT SWEEP

Check by substitution V19, V20, V21 and V23. Check adjustments B2, B3 and horizontal size adjustment. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check T3, T5A, R120, R121, C113, C114, C115 and other associated components.	Check R117, R118, C109, C110, R112, R113 and other associated components.

DRIVE LINES

Check adjustment B2. Check by substitution V19, V20 and V21. Check T3, T5A, C112, C115, C116, C114, C110, R117, R118 and other associated circuit components.

COMPRESSED LEFT SIDE

Check horizontal size adjustment. Check adjustments B2 and B3. Check horizontal output and damper circuit components especially T3 and T5A.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V19, V20 and V21. Check C108 for open. Check T3, T5A, T6 and other associated components.

XMAS TREE EFFECT

Substitute V19. Check L59, C109, C110 and other associated components for failure or change of value.

VERTICAL

LOSS OF SWEEP

Check by substitution V16 and V17. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T4, T5B and other associated components.	Check C100, R97, R5 and other associated components.

INSUFFICENT SWEEP

C heck adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V16 and V17. Check T4, T5B, C4D and other asssociated components.

COMPRESSED AT TOP

Check by substitution V16 and V17. Check C99, C100, T2, R97, R5 and other associated components.

FOLDS

Substitute V16 and V17. Check associated circuit components for failure or change of value.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V14 and V15. Check associated components for failure or change of value especially C72 and C93.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Check by substitution V15, V14 and V16. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check components associated with V16 especially T2, C95 and R94.	Check vertical integrator and other associated circuit components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V18 and V19. Check associated components especially C102, C103, C105 , C106, C104, C109, C110, R106, R107, R108, R109 and R110.

HORIZONTAL BENDING

Check by substitution V18, V19 and V20. Check the horizontal AFC filter network for failure of components.

VIDEO

LOSS OF VIDEO

Substitute V8. Check picture tube and other associated circuit components.

SOUND BARS (4.5MC Beat)

Adjust tuner tuning control for best picture and sound. Check adjustment A32. Check video IF alignment.

POOR CONTRAST

Substitute V8. Check video detector crystal and assembly. Check contrast control, picture tube and other associated circuit components.

NEGATIVE PICTURE

Check by substitution V8 and V9. Check video detector assembly. Check picture tube. Check AGC network for component failure.

SMEAR

Substitute V8. Check video detector crystal and assembly. Check C73, L53, L54, R57, R58, picture tube and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check V2, V3, V4, V5, V6, V7 and V8 for heater to cathode leakage. In case of UHF check V1. Check B+ filter capacitors for open.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: RAYTHEON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	UHF Oscillator	6A F4	6AF4	7DK	
V2A	RF Amplifier	6BZ7	6BZ7	9AJ	
B	RF Amplifier	6BQ7A	6BQ7A	9AJ	
V3	Converter	6U8	6U8	9AE	
V4	1st. Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V7	4th. Video IF Amp.	6CB6	6CB6	7CM	
V8	Video Output	6AH6	6AH6	7BK	
V9	AGC Keying	6AU6	6AU6	7BK	
V10	Sound IF Amp.	6AU6	6AU6	7BK	
V11	Ratio Detector	6AL5	6AL5	6BT	
V12	AF Amplifier	6AV6	6AV6	6BT	
V13	Audio Output	50C5	50C5	7CN	
V14	Sync Separator	6BE6	6BE6	7CH	
V15A	Sync Amplifier-AGC Clamper	6BF6	6BF6	7BT-	
B	Sync Amplifier-AGC Clamper	6AV6	6AV6	7BT	
V16	Vert. Oscillator	6BF6	6BF6	7BT	
V17	Vert. Output	6S4	6S4	9AC	
V18	Horiz. AFC	6AL5	6AL5	6BT	
V19	Horiz. Mult.	12AU7	12AU7	9A	
V20	Horiz. Output	25CD6G	25CD6G		
V21	Damper	12AX4	12AX4	4CG	
V22	HV Rectifier	1B3GT	1B3GT	3C	
V23	LV Rectifier	5Y3GT	5Y3GT	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: RAYTHEON PART No.	SYLVANIA PART No.	GENERAL ELECTRIC PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V24	24DP4A	24DP4A 24DP4		24DP4A	12L 12L	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RAYTHEON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▲30	150	8C-22730					FP216.1	TVL-3448	
B	▲200	150						TC47		
C2	150	150	8C-22464	AFHS1-70		XA004		FP117	TVL-3442	
C3	150	150	8C-22463	AFHS1-70		XA004		FP117	TVL-3442	
C4A	■30	300	8C-22536			C031			TVL-3790	
B	▲60	300				BR505			TVA-1310	
C	▲10	300								
D	60	50								
C5A	■20	300	8C-22524	AFH3-106		C078		FP330.3	TVL-3634	
B	10	25						TC30		
C	▲10	75								
C6	20	450	8C-22550	PRS450/20		BR2045		TC75	TVA-1709	
C7	5	450	8C-20557	PRS450/4		BR445		TC70	TVA-1702	
C8	20	150	8C-19546	PRS150/20		BR2015		TC45	TVA-1410	
C9	5			SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	Note 1
C10	5			SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	Note 1
C11	1000		8G-22383	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C12	1000		8G-20878							
C13A	1000		8G-19506	BPD-2X001	DD2-102	DK069	812-001	DCD-521	5HK-2D1	
B	1000									
C14	1000		8G-22120							
C15	1000		8G-22383	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C16	20		8G-21315							
C17	1000		8G-20878							
C18	100		201-22887	SI100	D6-101	TP34	GP1K-100	UC-531	5GA-T1	
C19	6		8G-20880							
C20	1000		8G-22656	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C21	1000		8G-22656	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C22	1000		8G-22656	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C23	100		8G-19862	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C24	20		8G-22276	SI20NP0	TCZ-20	TZ13	NP0K-200	ZT-542	5TCC-Q2	
C25	20		8G-22276	SI20NP0	TCZ-20	TZ13	NP0K-200	ZT-542	5TCC-Q2	
C26	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C27	3		8G-22772							
C28	1000									
C29	1000									
C30	.68		8G-12495-1		TCZ-.68	TZ02				
C31	1.7		8G-12495-8							
C32	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C33	10		8G-11789	SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C34	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C35	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C36	2.2		8G-12495-4	SI2.2NP0	TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C37	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C38	18		8G-22227		TCZ-18	TZ12	NP0K-180			
C39	2.5		8G-22367							
C40	2.5		8G-19568							
C41	1000		8G-22383	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C42	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C43	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C44	330		8G-17349	SI330	D6-331	TP43	GP2K-331	UC-5333	5GA-T33	
C45	1000									
C46	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C47	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C48	5000		8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C49	680		8G-21105	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C50	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C51	5		8G-12166	SI5NP0	TCZ-4.7	Z011	NP0-831-050	ZT-555	5TCCB-V47	

PROPERTY OF
L. F. BLANKENSHIP

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No	RATING CAP.	RATING VOLT	RAYTHEON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C52	7		8G-11790			Z01M	NPO-831-070			
C53	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C54	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C55	680		8G-21105	S1680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C56	1000		8G-13201	S1000	D6-102	TP52	GP2L-102		UC-521	5HK-D1
C57	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C58	680		8G-21105	S1680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C59	1000		8G-13201	S1000	D6-102	TP52	GP2L-102		UC-521	5HK-D1
C60	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C61	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C62	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C63	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C64	1000		8G-13201	S1000	D6-102	TP52	GP2L-102		UC-521	5HK-D1
C65	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C66	.047	400	8F-16081	PP88-047	DF-503	CUB4847			PT4147	47M-S47
C67	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C68	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C69	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C70	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C71	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C72	.01	400	8J-16089	P488-01	DD-103	CUB4S1	GP2-333-103		PT401	47M-S1
C73	.1	200	8J-18088	P288-1	DF-104	CUB2P1			PT401	2TM-P1
C74	100	500		1489-0001		SR5T1			MCB235	MS-31
C75	470	1000	8G-31440	RVD1S-00047		VT47	IR5KV-471		MCE247	10GA-T47
C76	.47	200	8J-20587	P288-47		CUB2P47			PT4047	2TM-P47
C77	.1	200	8J-18088	P288-1	DF-104	CUB2P1			PT401	2TM-P1
C78	.1	200	8J-18088	P288-1	DF-104	CUB2P1			PT401	2TM-P1
C79	3.3			SI3.3NP0	TCZ-3.3	T206	MP0K-3R3		ZT-5533	5TCCB-V33
C80	47			SI47N150	TCM-47	TN14	N750K-470		NT-5447	5TCU-Q47
C81	.0022	400	8J-30634	P488-0022	DD-223	CUB4D23	GP3-333-223		PT6223	47M-D23
C82	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C83	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C84	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C85	10000		8G-20369	BPD-01	DD-103	K082	81-01		DC-511	5HK-S1
C86	.1	400	8M-22982	P488-1	DF-104	CUB4P1			PT401	47M-P1
C87	.022	400	8M-23894	P488-022	DF-223	CUB4S22			PT4123	47M-S23
C88	10000		8G- 20369	BPD-01	DD-103	K082	81-01		DC-511	5HK-S1
C89	10000		8G-20369	BPD-01	DD-103	K082	81-01		DC-511	5HK-S1
C90	.01	400	8J-16044	P488-01	D6-103	CUB4S1	GP2-333-103		PT411	47M-S1
C91	10000		8G-20369	BPD-01	DD-103	K082	81-01		DC-511	5HK-S1
C92	.22	200	8J-16062	P288-22		CUB2P22			PT4022	2TM-P22
C93	.47	200	8J-30987	P288-47		CUB2P47			PT4047	2TM-P47
C94A	.0022		*ITA-22376	*PA-110-1	*PC-100	*1S7TM1	*1405-01		PT6222	
B	.0047								PT6247	*S10C1
C	.0047								PT6247	
C96	.0047	400	8J-20593	P488-0047	D6-472	CUB6D47	GP2-333-472		PT6247	6TM-D47
C97	.047	400	8J-16081	P488-047	DF-503	CUB4S47			PT4147	47M-S47
C98	.047	200	8J-16090	P288-047	DF-503	CUB2S47			PT4047	47M-S47
C99	.047	400	8J-16081	P488-047	DF-503	CUB4S47			PT4147	47M-S47
C100	5000		8G-13962	BPD-005	DD-502	K080	81-005		DC-525	5HK-D5
C100	.1	600	8J-20907	P488-01	D6-104	CUB6P1			PT601	6TM-D1
C101	.01	600	8J-16097	P488-01	D6-103	CUB6S1	GP2-333-103		PT611	6TM-S1
C102	22			SI22	D6-220	TP23	GP1K-220		UC-5423	5GA-Q23
C103	220	500		8F3-117		22S1T22				
C104	680	500		8F3-123		1479-0007			MS-37	
C105	220	500		8F3-117		1479-0007				
C106	680	500		8F3-123		SR5T1			MS-37	
C107	.1	200	8J-16085	P288-1	DF-104	CUB2P1			PT401	2TM-P1
C108	.0022	200	8J-20578	P288-0022	D6-222	CUB4D22	GP2-333-222		PT6222	6TM-D22
C109	5900	500	8J1-123	1654-0004		BD5D9			MC3463	MS-34
C110	470	500	8F3-121	1469-0006		SR5T47			MCB245	MS-35
C111	.22	400	8J-16095	P488-22		CUB4P22			PT4022	47M-P22
C112	270	500	8F3-118	1469-0003		SR5T27				MS-33
C113	.047	400	8J-16081	P488-047	DF-503	CUB4S47			PT4147	47M-S47
C114	.047	200	8J-16090	P288-047		CUB2S47			PT4147	2TM-S47
C115	.068	400	8J-30696	P488-068		CUB4S68				47M-S68
C116	.22	400		P488-22		CUB4P22			PT4022	47M-P22
C117	68	2000		HVD30-00006			3KV-560			20GA-Q68

Note 1. Some Models use 100MMF in this application (part #8G-22857)
Note 2. Some Models use .047MFD in this application (part #8J-16081)
Note 3. Some Models use .033MFD in this application (part #8J-16096)
Note 4. Some Models use 47MMF in this application (part #8G-19863)
Note 5. Not used in early models. Some Models use 5900MMF (part #8G-13962).
Note 6. Value may vary from 42MMF to 82MMF. Use original value for replacement.
+ Items C94A, C94B, C94C, R92A, R92B, R92C are combined in one unit.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	RAYTHEON PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	50KΩ	½	B10B-17764	Q11-123	A47-50K-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R1A
R2A	1 Meg	½	B10B-19542	Q13-137	A47A-1 Meg2	BSK-70	U-53	Tone
B	Shaft		Not Req.	Not Req.	KS8-3	Not Req.	Not Req.	Attach to R2A
R3A	1 Meg	½	B10A-22308	Q18-137X		ABT-7417		Volume
B	Shaft		Not Req.	Not Req.		AK-4		Attach to R3A
C	Switch		Not Req.	764-1		KN-1		Attach to R3A
R4A	5000Ω	½	A10B-22687	Q11-114	A47-5000-S	B-10	U-14	Vert Linearity
B	Shaft		Not Req.	Not Req.	KS8-3	Not Req.	Not Req.	Attach to R4A
R5A	750KΩ with 250KΩ Stop	½	A-10B-22307	Q11-136		AB-59		Vert. Size - Note
B	Shaft		Not Req.	Not Req.		AK-4		Attach to R5A
R6A	750Ω	½	B-10B-22306	Q17-105		AB-5	U-3	Picture
B	Shaft		Not Req.	Not Req.		AK-4	Not Req.	Attach to R6A
R7A	500KΩ	½	B-10B-21456	Q11-133	A47-500K-S	AB-59	U-50	Brightness
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R7A
R8A	3 Meg	½	B-10B-17318	Q11-140	A47-2.5Meg-S	AB-84	U-57	Vert. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R8A

Note: Connect a 250KΩ resistor in series with the left hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	RAYTHEON PART No.	IRC PART No.	NOTES
R9	470KΩ	½	9BI-29	BTS-470K	
R10	15Ω	½	9BI-40	BTS-15	
R11	56Ω	½	9BI-47	BTS-56	
R12	22Ω	½	9BI-42	BTS-22	
R13	4700Ω	½	9BI-70	BTS-4700	
R14	22Ω	½	9BI-43	BTS-23	
R15	56Ω	½	9BI-47	BTS-56	
R16	56Ω	½	9BI-47	BTS-56	
R17	330Ω	½	9BI-54	BTS-330	
R18	470KΩ	½	9BI-29	BTS-470K	
R19	10KΩ	½	9BI-74	BTS-10K	
R20	100KΩ	½	9BI-86	BTS-100K	
R21	10Ω	½	9BI-38	BTS-10	
R22	1000Ω	½	9BI-62	BTS-1000	
R23	22KΩ	½	9BI-78	BTS-22K	
R24	220KΩ	½	9BI-27	BTS-220K	
R25	33KΩ	½	9BI-80	BTS-33K	
R26	27KΩ	½	9BI-79	BTS-27K	
R27	10KΩ	½	9B2-74	BTA-10K	
R28	10KΩ	½	9BI-74	BTS-10K	
R29	220Ω	½	9BI-56	BTS-220	
R30	1500Ω	½	9BI-14	BTS-1500	
R31	8800Ω	½	9BI-72	BTS-8800	
R32	1000Ω	½	9BI-62	BTS-1000	
R33	82Ω	½	9BI-49	BTS-82	
R34	1000Ω	½	9BI-62	BTS-1000	
R35	1000Ω	½	9BI-62	BTS-1000	
R36	22KΩ	½	9BI-78	BTS-22K	
R37	12KΩ	2	9B4-75	BTB-12K	Note 4
R38	22KΩ	½	9BI-78	BTS-22K	
R39	47KΩ 5%	½	9BI-199	BTS-47K 5%	
R40	1000Ω	½	9BI-62	BTS-1000	
R41	68Ω	½	9BI-48	BTS-68	
R42	27KΩ 5%	½	9BI-193	BTS-27K 5%	
R43	1000Ω	½	9BI-62	BTS-1000	
R44	1000Ω	½	9BI-62	BTS-1000	
R45	47Ω	½	9BI-46	BTS-47	
R46	47KΩ 5%	½	9BI-199	BTS-47K 5%	
R47	1000Ω	½	9BI-62	BTS-1000	
R48	180Ω	½	9BI-53	BTS-180	
R49	22KΩ	1	9B2-78	BTA-22K	
R50	15KΩ 5%	½	9BI-187	BTS-15K 5%	
R51	5600Ω	½	9BI-71	BTS-5600	
R52	10KΩ	1	9B2-74	BTA-10K	
R53	3900Ω	½	9BI-69	BTS-3900	
R54	47KΩ	½	9BI-82	BTS-47K	
R55	5600Ω	2	9B4-71	BTB-5600	
R56	15KΩ	½	9BI-76	BTS-15K	
R57	5600Ω	½	9BI-71	BTS-5600	
R58	220KΩ	½	9BI-90	BTS-220K	
R59	100KΩ	½	9BI-86	BTS-100K	
R60	220KΩ			BTS-220K	
R61	22KΩ	½		BTS-22K	
R62	1 Meg	½	9BI-98	BTS-1 Meg	
R63	100KΩ	½		BTS-100K	
R64	130Ω	½	9BI-51	BTS-120	
R65	8200Ω	2	9B4-73	BTB-8200	
R66	47Ω	½	9BI-46	BTS-47	
R67	22KΩ	½	9BI-78	BTS-22K	
R68	22KΩ	½	9BI-78	BTS-22K	
R69	470KΩ	½	9BI-94	BTS-470K	
R70	47KΩ	½	9BI-82	BTS-47K	
R71	10 Meg	½	9BI-110	BTS-10 Meg	
R72	470KΩ	½	9BI-94	BTS-470K	
R73	470KΩ	½	9BI-94	BTS-470K	
R74	120Ω	½	9B2-51	BTA-120	
R75	47KΩ	½	9BI-82	BTS-47K	
R76	47KΩ	½	9BI-82	BTS-47K	
R77	2.3Meg	½	9BI-102	BTS-2.3Meg	
R78	1.5 Meg	½	9BI-100	BTS-1.5Meg	
R79	100KΩ	1	9B2-86	BTA-100K	
R80	15KΩ	½	9BI-76	BTS-15K	Note 5
R81	100KΩ	½	9BI-86	BTS-100K	
R82	33KΩ	½		BTS-33K	Note 6
R83	1 Meg	½	9BI-98	BTS-1 Meg	Note 5
R84	47KΩ	½	9BI-82	BTS-47K	
R85	47KΩ	½	9BI-82	BTS-47K	
R86	220KΩ	½	9BI-90	BTS-220K	
R87	560KΩ	½	9BI-95	BTS-560K	
R88	3.3Meg	½	9BI-104	BTS-3.3Meg	
R89	22KΩ	½	9BI-78	BTA-22K	
R90	10 Meg	½	9BI-110	BTS-10 Meg	
R91	68KΩ	½	9BI-84	BTS-68K	
R92A	22KΩ			BTS-22K	
B	8200Ω	+	*17A-22376	BTS-8200	
C	8200Ω			BTS-8200	
R93	100KΩ	½	9BI-86	BTS-100K	
R94	6.8Meg	½	9BI-108	BTS-6.8Meg	
R95	47KΩ	½	9BI-82	BTS-47K	
R96	4.7Meg	½	9BI-106	BTS-4.7Meg	
R97	330KΩ	½	9BI-92	BTS-330K	
R98	2.2Meg	½	9BI-102	BTS-2.2Meg	
R99	1000Ω	½	9BI-62	BTS-1000	
R100	3300Ω	½	9BI-68	BTS-3300	
R101	1800Ω	½	9BI-65	BTS-1800	
R102	220KΩ	½	9BI-90	BTS-220K	
R103	1000Ω	½	9BI-62	BTS-1000	
R104	1000Ω	½	9BI-62	BTS-1000	
R105	1000Ω	½	9BI-62	BTS-1000	
R106	150KΩ	½	9BI-88	BTS-150K	
R107	2.2Meg	½	9BI-102	BTS-2.2Meg	
R108	150KΩ	½	9BI-88	BTS-150K	
R109	2.2Meg	½	9BI-102	BTS-2.2Meg	
R110	470KΩ	½	9BI-94	BTS-470K	
R111	1 Meg	½	9BI-98	BTS-1 Meg	
R112	1800Ω	1		BTS-1800	Note 3
R113	5600Ω	1	9B2-71	BTA-5600	
R114	220KΩ	½	9BI-90	BTS-220K	
R115	3.3Meg	½		BTS-3.3Meg	
R116	5600Ω	½	9BI-71	BTS-5600	
R117	150KΩ	½	9BI-88	BTS-150K	
R118	1 Meg	½	9BI-98	BTS-1 Meg	
R119	220Ω	½	9BI-54	BTS-220	
R120	68000Ω	1			Note 1
R121	6800Ω	2	9B4-72	BTB-6800	
R122	1500Ω	1	9B2-14	BTA-1500	
R123	6.8Ω	1			Note 2
R124	35Ω	15	9M-22542		
R125	110Ω	25	9M-22583		
R126	5Ω	10	4M-23018		
R127A	2200Ω	10	9M-22275		
B	1500Ω	10			
R128	5.6Ω	½	9C1-1072		
R129	220Ω			BTS-220	Note 5
R130	1 Meg	½	9BI-98	BTS-1 Meg	Note 5

Note 1. Some models may use a 33KΩ resistor in this application.
Note 2. Some models may use a 10Ω resistor in this application.
Note 3. Some models may use a 1500Ω resistor in this application.
Note 4. Some models may use a 22KΩ resistor in this application.
Note 5. Not used in all models.
No te 6. Some models may use a 15KΩ resistor in this application.
+ Items R92A, R92B, R92C, C94A, C94B, C94C, are combined in one unit.

TRANSFORMER (POWER)

ITEM No	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RAYTHEON PART No.	Stancor PART No	Merit PART No.	Triad PART No.	RCA TYPE No	Halldorson PART No	Thordarson PART No
T1	115VAC @.7A	324VCT .146ADC	5VAC @3A	12A22509						
		SEC. 3	SEC. 4	SEC. 5						
		6.3VAC @.94A	6.3VAC @5.1A							

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	RAYTHEON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T2	Vert. Osc. Trans.	12M-18241	A-8125	A-3003	A-97X	209T1 ①	B6702	TV-24A87 ①
T3	Horiz. Output Trans.	201-22383					P3413 ②	
T4	Vert. Output Trans.	12C-20761-3	A-8141	A-3039	A-109X		Z1806	T-26854
T5A	Yoke (90°) Horiz. (L. 5MH)	201-22957 ③		MDF-90 ④	Y-50	219D1 ④		
B	Yoke - Vert. (43MH)							
T6	Horiz. Lin. Coil (7-2.9MH, tapped)	201-30186-1	WC-2 ①	MWC-4 ⑤ ⑥		30R5 ⑤		

① Drill one new mounting hole.
② Connect original terminal #10 to new terminal #4, original #8 to new #3, original #4 to new #1, original #1 to new #7, original #2 to new #8, original #3 to new #10.
③ Deflection yoke assembly includes the following : Yoke (part #13M-22810)
Resistors, R103, R104, R105
Capacitor, C117
Horiz. Yoke Cable (part #201-22489-1)
Vert. Yoke Cable (part #201-22690)
④ Use original yoke network.
⑤ Use original slider.
⑥ Enlarge mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE	RAYTHEON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T7	1.94KΩ 3.1Ω	12C22508	A-3876	A-2928	S-2X	Z1001		

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V C IMP	RAYTHEON PART No	JENSEN PART No	QUAM PART No	NOTES
SP1	8"	PM	3.1Ω	18A19927	8T-115 Mod. P8-V	8A21	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	UHF Ant.Coil	0Ω						
L2	UHF Ant. Coil	0Ω						
L3	UHF Ant. Coupling loop	00CT		82D-22401				
L4	UHF RF Coupling loop	0Ω (tapped)		82D-22254				
L5	UHF Mixer Coupling loop	0Ω		82D-22360				
L6	Fil. Choke	0Ω		16A-22411				
L7	Cathode Choke	0Ω		16A-22411				
L8	RF Choke	1.1Ω		16A-23383				
L9	UHF IF Output coil	00CT		13B-23410				
L10	IF Trap	0Ω		13M-22625				Wound on 82 MMF capacitor
L11	VHF Ant. Trap	.7Ω	.7Ω	12M-22482				
L12	VHF Ant. Trap	.7Ω	.7Ω	13M-22482				
L13	IF Trap	0Ω		13M-23435				Wound on 82MMF capacitor
L14	IF Trap	0Ω		13M-22702				Wound on 82 MMF capacitor
L15	RF Choke	.1Ω		201-20405				
L16	VHF Ant. Coil	0Ω		13M-23338				Low band; core Part # 51A-22408
L17	VHF Ant.Coil	0Ω		13E-17140				High band; core Part # 51A-23409
L18	Fil. Choke	.1Ω		201-20405				
L19	Fil. Choke	.2Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L20	Neutr. Coil	0Ω		13M-23044				
L21	RF Choke	.8Ω		16A-17728				
L22	VHF RF Coil	0Ω		13M-23325				Low band; core Part # 51A-22407
L23	VHF RF Coil	0Ω		13E-17140				High band; core Part # 51A-23409
L24	VHF Mixer grid coil	0Ω		13M-23327				Low band; core Part # 51A-22405
L25	VHF Mixer grid coil	0Ω		13E-17140				High band; core Part # 51A-23409
L26	Fil. Choke	.1Ω		16A-20777				
L27	VHF Osc. Coil	0Ω		13M-23703				Low band; core Part # 51A-23406
L28	VHF Osc. Coil	0Ω		13E-17140				High band; core Part # 51A-23404
L29	RF Choke	0Ω		13M-22738				
L30	Conv. Plate	.2Ω	.2Ω	13B-22428				
L31	RF Choke	2.4Ω		201-15808	19-3036	TV-180	4626	20 Microhenries
L32	RF Choke	2.2Ω		201-15808	19-3036	TV-180	4626	20 Microhenries
L33	1st Video IF Grid	.2Ω	.2Ω	201-22456	17-4531 *		6232 ▲	Includes trap & 1K Ω resistor
L34	Fil. Choke	.2Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L35	1st Video IF Plate	.8Ω		201-22562	17-4504 ■		6231 ♦	Includes 3.9KΩ resistor & 470 MMF capacitor
L36	RF Choke	2.3Ω		201-15808	19-3036	TV-180	4626	20 Microhenries
L37	41.25MC Trap	0Ω		201-22585				
L38	47.25MC Trap	0Ω		201-22588	20-1047			
L39	2nd Video IF	.3Ω		201-22570	17-4504 ■		6234 ◆	
L40	Fil. Choke	.1Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L41	3rd Video IF	.1Ω		201-22426	17-4503 ●		6233 ●●	Includes capacitors
L42	RF Choke	1.7Ω		201-15808	19-3036	TV-180	4626	20 Microhenries
L43	Fil. Choke	.1Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L44	RF Choke	2.2Ω		201-15808	19-3036	TV-180	4626	20 Microhenries
L45	4th Video IF	.1Ω		201-22435	17-4503 ■		6233 ■	Includes trap and 7MMF capacitor
L46	RF Choke	2.3Ω		16A-23024	19-6022	TV-180	6152	20 Microhenries
L47	RF Choke	2.3Ω		201-15808	19-3036	TV-180	4626	20 Microhenries
L48	Fil. Choke	.2Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L49	5th Video IF	.5Ω	.5Ω	13B-23430				Includes capacitors & Series Peak. Coil
L50	RF Choke	2.3Ω		201-15808	19-3036	TV-180	4626	20 Microhenries
L51	Series Peak. Coil	1.7Ω		16A-22427	19-1004		4610	7.5 Microhenries

RAYTHEON MODELS UC-2403A, UC-2404A, UC-2405A, UC-2406A (Ch.24T2)

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L52	Shunt Peak. Coil	23Ω		16A-19365			4648	410 Microhenries
L53	Series Peak. Coil	23Ω		16A-19365			4648	410 Microhenries
L54	Shunt Peak. Coil	23Ω		16A-19365			4648	410 Microhenries
L55	Shunt Peak. Coil	23Ω		16A-19365			4648	410 Microhenries
L56	4.5MC Trap	1.1Ω		201-22571	20-1004	TV-151	1470	Raytheon Part # includes C74
L57	Sound IF	3.7Ω		201-22582	17-3400	TV-151	1469	
L58	Ratio Det.	7Ω	1.5ΩCT	13M-22303	17-3497	TV-115	6205	Tertiary winding=.75Ω
L59	Horiz. Osc.	80Ω		201-22949	19-1575	TV-163 †	6210 †	Includes core; core Part # 51A-19322
L60	RF Choke	14Ω					4652	1.1 Microhenries; Not used in all models

* Add 1KΩ resistor across primary winding, disconnect R31, cut out chassis hole and drill mounting holes.
▲ Add 1KΩ resistor across primary winding, cut out chassis hole and use clip mounting.
▲ Detune trap, add 3.9KΩ resistor and 470 MMF capacitor externally, cut out chassis hole and drill mounting holes.
♦ Use one winding only, add 3.9KΩ resistor and 470MMF capacitor externally, cut out chassis hole and use clip mounting.
■ Detune trap, cut out chassis hole and drill mounting holes.
‡ Use one winding only, cut out chassis hole, and use clip mounting.
# Detune trap, add 15 MMF capacitor externally, cut out chassis hole and drill mounting holes.
** Use one winding only, detune trap, add 15 MMF capacitor externally, cut out chassis hole,and use clip mounting.
¶ Add 7MMF capacitor externally, cut out chassis hole and drill mounting holes.
§ Use primary and trap windings only, add 7 MMF capacitor externally, cut out chassis hole,and use clip mounting.
† Enlarge mounting hole.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA RAYTHEON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L61	.148ADC	107Ω	2.25 Hy.	16A22584	C-2304①			C5026①	
L62	.330ADC	39.4Ω	1.1 Hy.	16A22448			C-17X①		
L63	.330ADC	39.4Ω	1.1 Hy.	16A22448			C-17X①		

① Drill one new mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA RAYTHEON PART No.	SELETRON PART No.	FEDERAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	NOTES
M1	.330ADC	21J22274		1023A	6S350	350A	
M2	.330ADC	21J22274		1023A	6S350	350A	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA RAYTHEON PART No.	REPLACEMENT DATA SYLVANIA PART No.		NOTES
M3	1N82	8M-22649	1N82 or 1N82A		UHF Mixer (Clip-in)
M4	CK706	8M-21959	1N60		Video detector (pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	RAYTHEON PART No.	NOTES
M5	Dial Light	46A-10793	(2) #47 Bayonet
M6	Tuner	C2A-22118	UHF
M7	Tuner	C2C-22190	VHF
M8	Switch	20M-22462	UHF Osc.
M9	Switch	20B-22422	UHF-VHF antenna changeover
M10	Switch		TV-Phono
M11	Centering Magnet	16M-20697	
M12	Ion Trap	16M-19906	
M13	Correction Magnet	16M-22873	(2) used
M14	Cathode Switch	201-22202	VHF Osc.
	Trimmer Cap.	8E-22419	Video Coupling
B2	Trimmer Cap.	8E-22538	Sound discriminator & horiz. drive (170-780MMF)
	Cabinet	24D-22914	UC-2403
	Cabinet	24D-22913	UC-2404
	Cabinet	24D-22902	UC-2405
	Cabinet	24D-22916	UC-2406
	Safety Glass	30M-22880	
	Escutcheon Assy.	200-22560	Includes dial plate & pulley, bead chain, spring, reflector, pointer, pad & link, fastener, VHF & UHF scales & trade crest
	Knob	5B-22637	Tuning
	Knob	5B-22613	Picture & volume
	Knob	5B-22497	TV-phono switch
	Knob	5B-20755	Star knob (4 used)

TROUBLE SHOOTING AIDS (cont)

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AUDIO

WEAK OR NO SOUND

Check by substitution V10, V11, V12 and V13. Check stages V12 and V13 using an audio signal generator. Apply audio signal across R71.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V12 and V13 especially C90 and T7.

BUZZ

Adjust tuner control for best picture and sound. Adjust A15 for minimum buzz. If still unsatisfactory, substitute V11 and realign ratio detector and audio IF stages.

DISTORTED

Check by substitution V10, V11, V12 and V13. Proceed as outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly, switch on volume control and T1. If filaments light, check V23, M1 and M2. Check other B+ filter and decoupling network components.

SMALL AND/OR DIM PICTURE

Substitute V23. Check M1, M2 and other B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V19, V20, V21 and V22. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T6, R123, C113 and other associated components.	Check horizontal drive trimmer, R117, R118 and other associated circuit components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V19, V20, V21 , V22 and V23. Measure B+ at 330V point.

If Satisfactory	If Unsatisfactory
Follow procedure outlined under "Loss of High Voltage".	Check M1, M2 and other B+ filter components.

BLOOMING

Check by substitution V19, V20, V21, V22 and V23. Check T3, T5A, R123, C113 and other associated circuit components for failure or change of value.

GENERAL

RASTER SOUND NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER PICTURE NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER NO SOUND NO PICTURE

Check by substitution V2, V3, V4, V5, V6 and V7. Check associated components. Check video detector assembly. In case of UHF check V1.

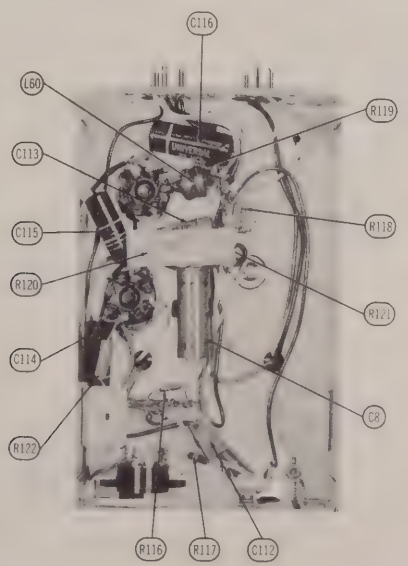
NO RASTER NO SOUND

Follow procedure outlined under "Dead Set".

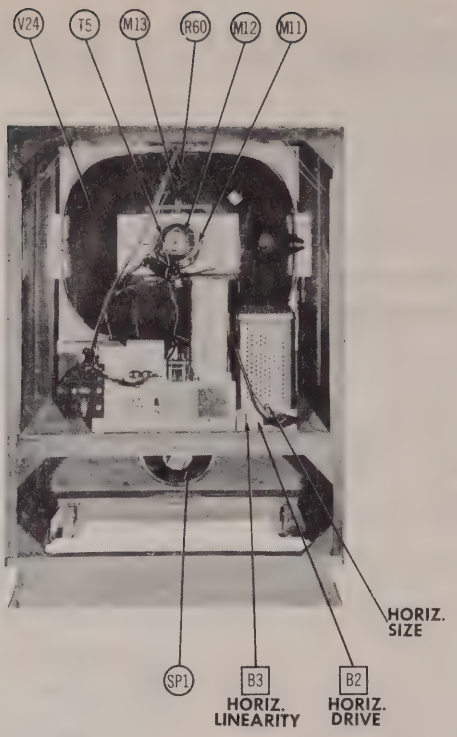
INTERMITTENT STREAKS

Check video signal for interference pulses. Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



POWER SUPPLY CHASSIS - BOTTOM VIEW



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

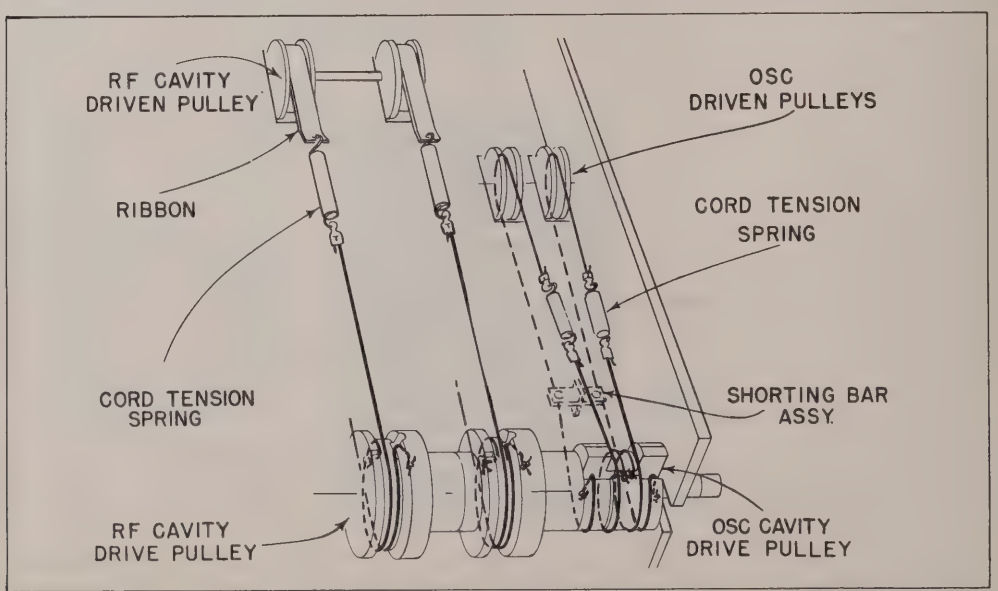
Set the horizontal hold control to the center of its range. Adjust the horizontal oscillator slug (B1) until picture synchronizes. Continue turning B1 in same direction until picture just loses sync, then back off to a point approximately in the center of the effective range of B1. Momentairly interrupt signal by switching off channel and back again. Picture should remain in sync. If necessary, readjust B1 until this condition is obtained.

Adjust the horizontal drive trimmer (B2) counter clockwise as far as possible without the presence of vertical white lines or compression near the center of the picture.

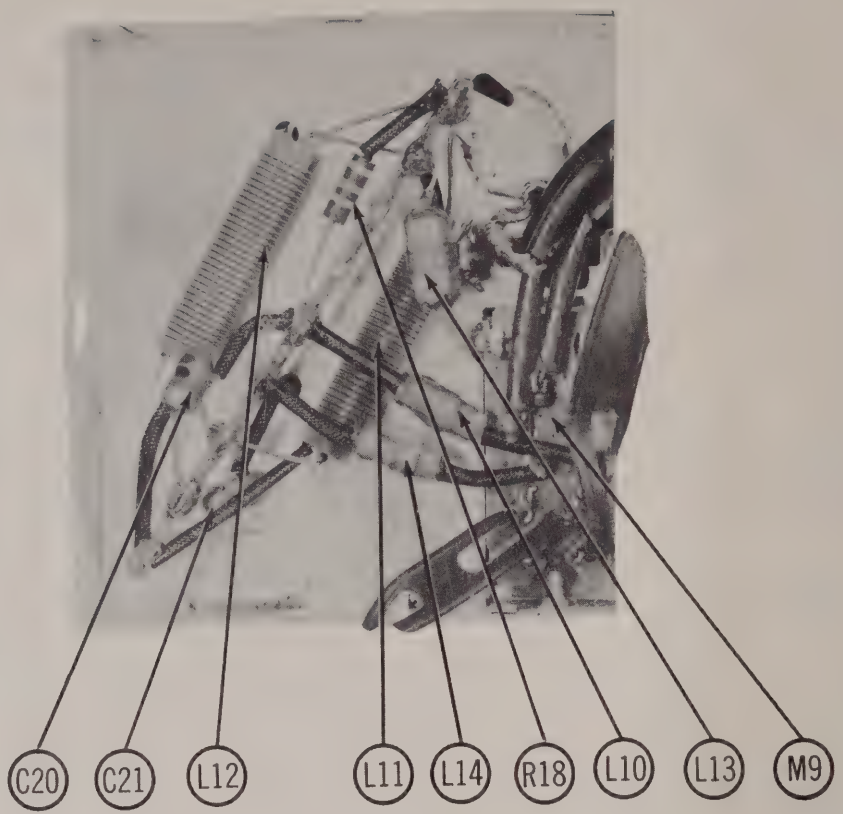
Adjust the horizontal size control for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the horizontal linearity slug (B3) for a picture that is symmetrical from left to right.

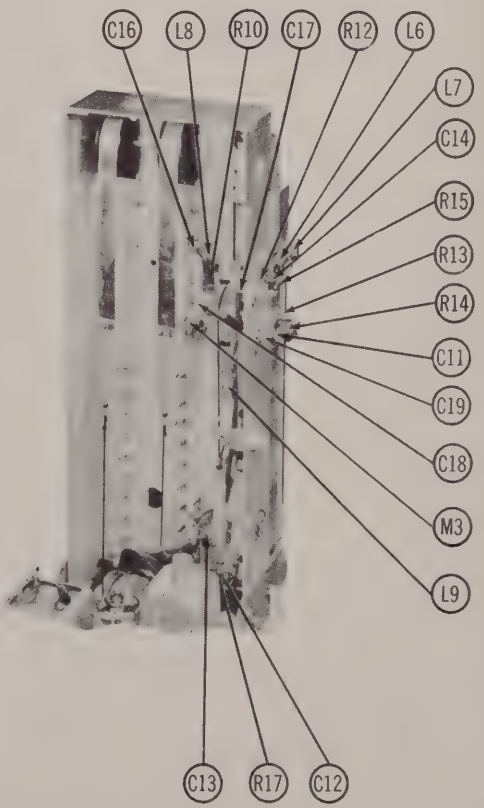
If either the horizontal drive control or B3 required major adjustment the horizontal drive trimmer, B2, should be readjusted.



UHF DRIVE CORD STRINGING



ANTENNA INPUT ASSY.



UHF TUNER

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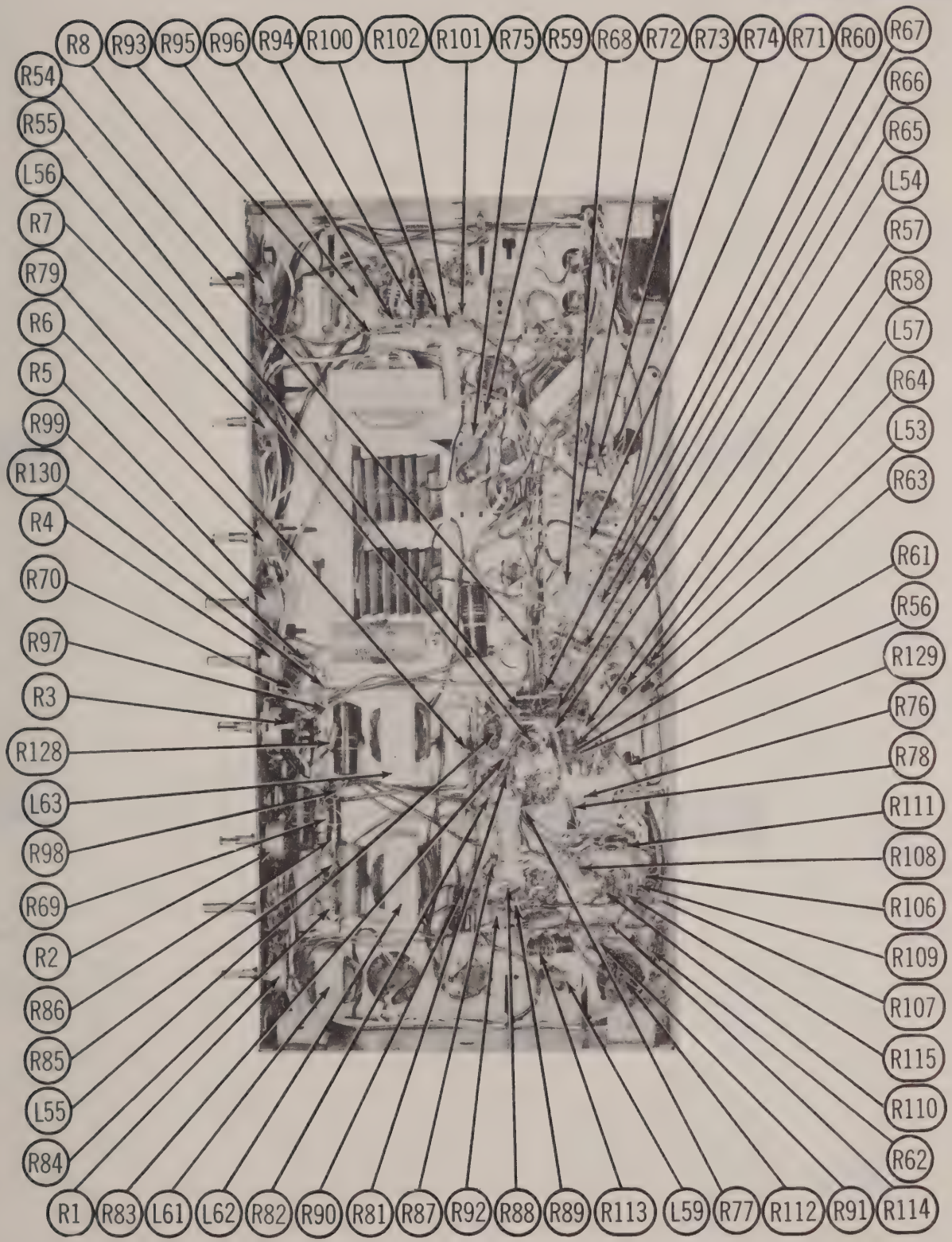


DEFLECTION CHASSIS – RESISTOR & INDUCTOR IDENTIFICATION

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustment of RF tuner oscillator adjustments, it is necessary to remove the chassis from the cabinet. (See disassembly instructions).

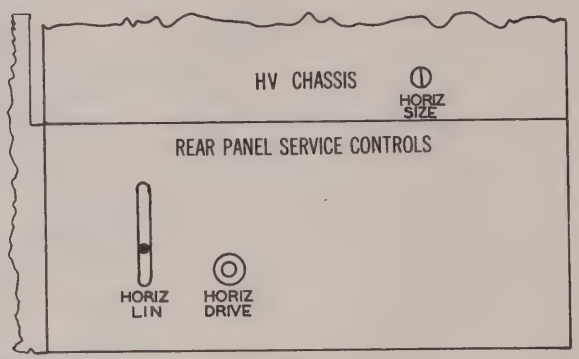
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove three (3) wood screws holding wood strip at the bottom of safety glass. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on to chassis. Set the horizontal hold control at the center of its range and adjust the horizontal oscillator slug (L59) until picture synchronizes horizontally. (For location see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L58) located on top of chassis. (See tube placement chart).

FUSES

One fuseable resistor is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

BUILT-IN ANTENNA TUNING

Built-in antenna can be adjusted from rear of cabinet. Adjust for a picture of maximum contrast and minimum ghost.

ANTI-PIN CUSHION ADJUSTMENT

Reduce the picture size so that the sides of the raster are visible, and position the magnets so that all sides are straight lines and the corners are at right angles.

DISASSEMBLY INSTRUCTIONS

Remove 1 push on type control knob from front panel.

Remove 1 push on clamp, then remove 1 knob.

Remove set screw from tuning shaft.

Remove 4 metal screws. Remove front panel cover.

Remove 7 push on type control knobs.

Disconnect built-in antenna.

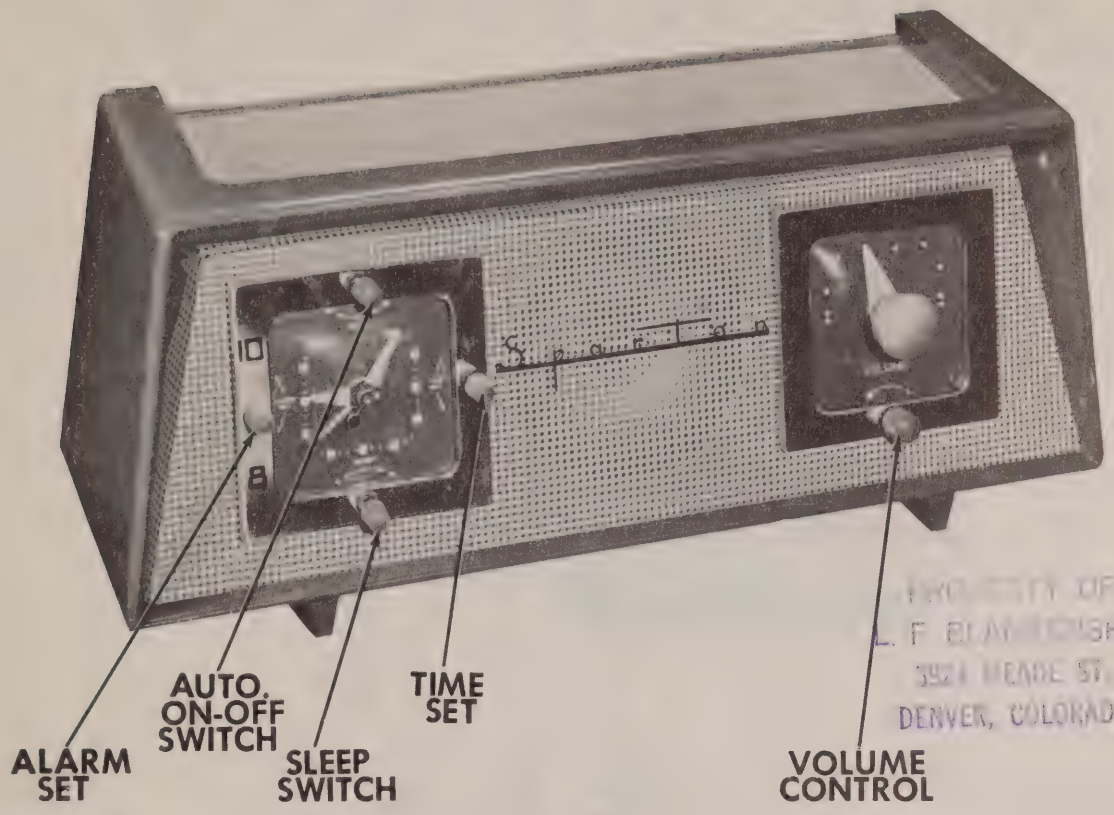
Remove 6 wood and 1 metal screws. Remove rear cover .

Disconnect speaker plug, yoke plugs, CRT socket and HV plug.

Remove 8 chassis bolts. Remove chassis.

Remove 4 speaker nuts. Remove speaker.

SPARTON MODELS
320C, 321C, 325C, 329C (Ch. 5B3C)



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SPARTON MODELS
320C, 321C, 325C, 329C (Ch. 5B3C)

TRADE NAME	Sparton Models 320C, 321C, 325C, 329C (Ch. 5B3C)
MANUFACTURER	Sparks-Withington Co., Jackson, Mich.
TYPE SET	AC Operated AM Superheterodyne Receiver with Electric Clock
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial. Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.02MFD	High side to pin 7 (grid) of 12BE6 (V1) Low side to B-.	456KC (400∿Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1600KC	1600KC	"	A5, A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. A6 is preset at factory (located opposite A5 on on oscillator stator section of tuning gang). If adjustment becomes necessary set A6 at approximately mid-capacity and adjust A5 for maximum deflection at 1600KC.
3.		"	1400KC	1400KC	"	A7	Adjust A7 for maximum deflection while rocking tuning gang thru 1400 KC signal. Check calibration at 600, 1000 and 1400KC. If necessary, repeat steps 2 and 3.

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PARTS LIST AND DESCRIPTIONS

SPARTON MODEL 320C (Ch. 5B3C)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: SPARTON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SPARTON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	50	150	PA4311	PRS150/50-50		BBRD5515		2N521	TVA-2453	Yellow
B	40	150								Red
C2	.05	200		P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C3	33		PA4347-2		TCN-33	TN10	N750A-330		5TCU-Q33	
C4	.05	400	PC40HL-503	P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C5	150		PA4347-5				N470S-151			
C6	3000		HK35F-302	SI3000	D6-302	TP60	GP2-333-302	UC-523	5GA-D3	
C7A	100		♦PA4329-1	♦PA-97	♦PC-50	♦111TM1	♦1403-01	UC-531	♦100C1	
B	100							UC-531		
C8	2000		PA4334-3	BPD-002	DD-202	K072	801-002	DC-522	5HK-D2	
C9	2000		PA4334-3	BPD-002	DD-202	K072	801-002	DC-522	5HK-D2	
C10	10000		PA4334-2	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C11	5000		PA4334-1	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C12	.05	400	PC40HL-503	489ZX-05		PJ4S5		PT415	4TM-S5	
C13	.1	400	PC40FL-104	P488-1		CUB4P1		PT401	4TM-P1	

♦ Items C7A, C7B and R7 are combined in one unit.

CONTROLS

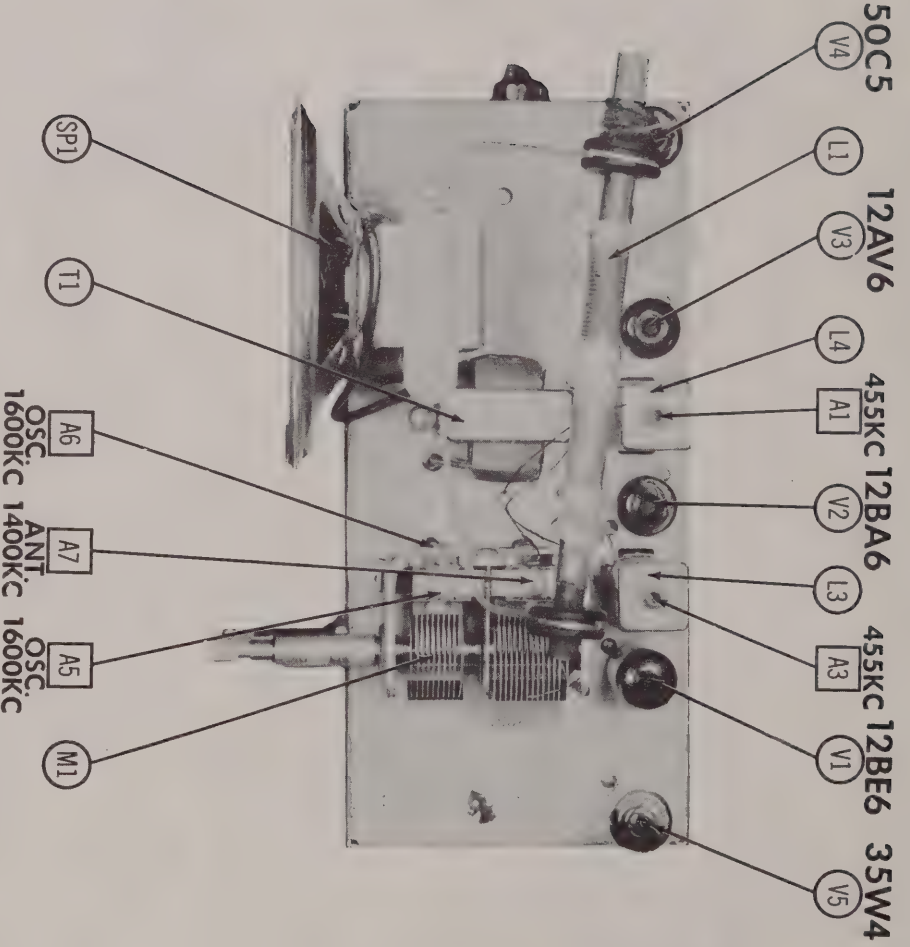
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SPARTON PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	PA-4455-1	Q13-133	AG-60-Z	BSK-60	U-48	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: SPARTON PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	22KΩ	½	BR12S-223	BTS-22K	
R3	1 Meg	½	BR12N-105	BTS-1 Meg	
R4	68Ω	½	BR12S-680	BTS-68	
R5	470Ω	½	BR12S-471	BTS-470	
R6	2.2Meg	½	BR12N-225	BTS-2.2Meg	
R7	47KΩ	½	♦ PA4329-1	BTS-47K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: SPARTON PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R8	10 Meg	½	BR12N-106	BTS-10 Meg	
R9	220KΩ	½	BR12S-224	BTS-220K	
R10	470KΩ	½	BR12N-474	BTS-470K	
R11	150Ω	½	BR12S-151	BTS-150	
R12	1200Ω	1	CR12S-122	BTA-1200	
R13	68Ω	1	CR12S-680		

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	SPARTON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	2.4KΩ	3Ω	AB44069-1	A-3336	A-3031 ①		Z1102 ①	TS-24S50A ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	SPARTON PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.3Ω	PC-63000-48	ST-113 Mod P4-X	4A1	

COILS (RF-IF)

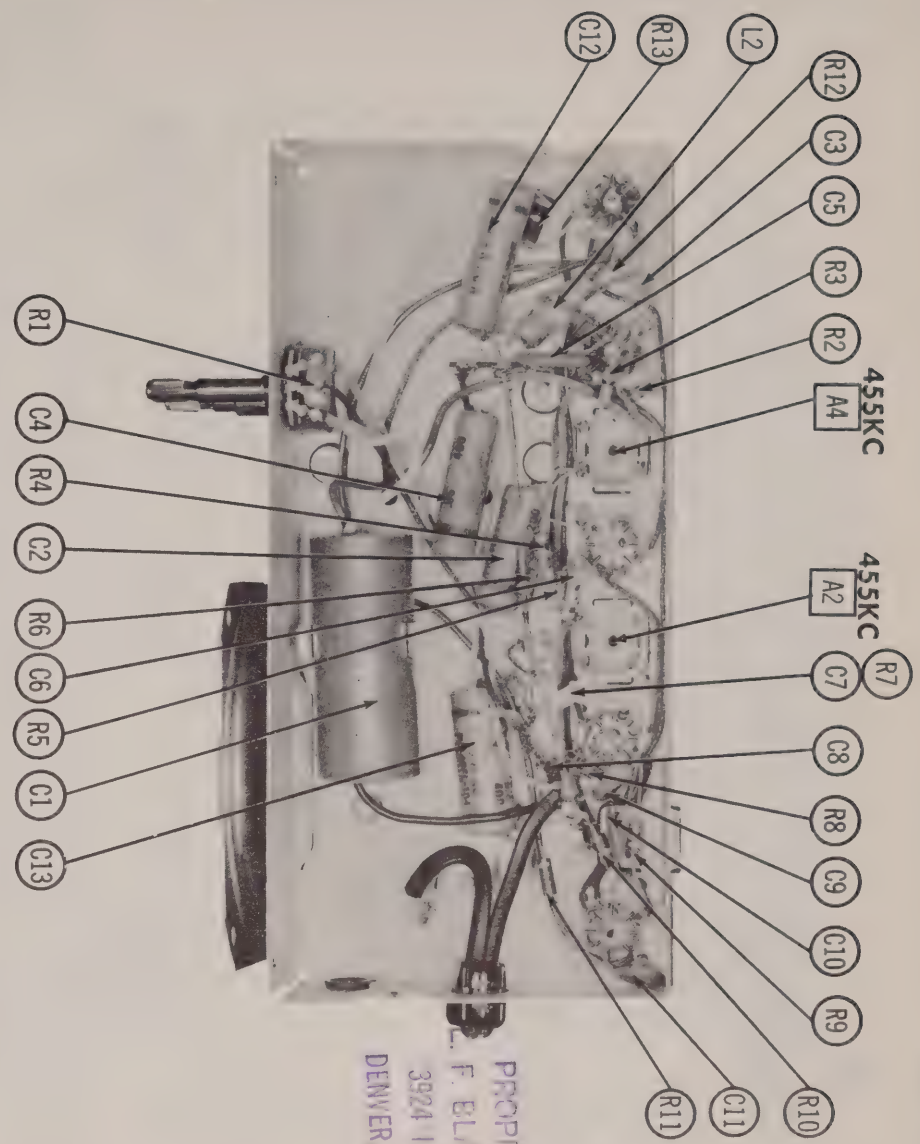
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	SPARTON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil		.2Ω	AB43592-1				
L2	Osc. Coil	.5Ω	5Ω	AA6797-5	14-1074		70-Osc.†	
L3	Input IF	14Ω	14Ω	PB42201-3	16-6758	BC-352	12-C1	
L4	Output IF	14Ω	14Ω	PB42201-3	16-6758	BC-353	12-C2	

† Disregard tap on secondary winding.

MISCELLANEOUS

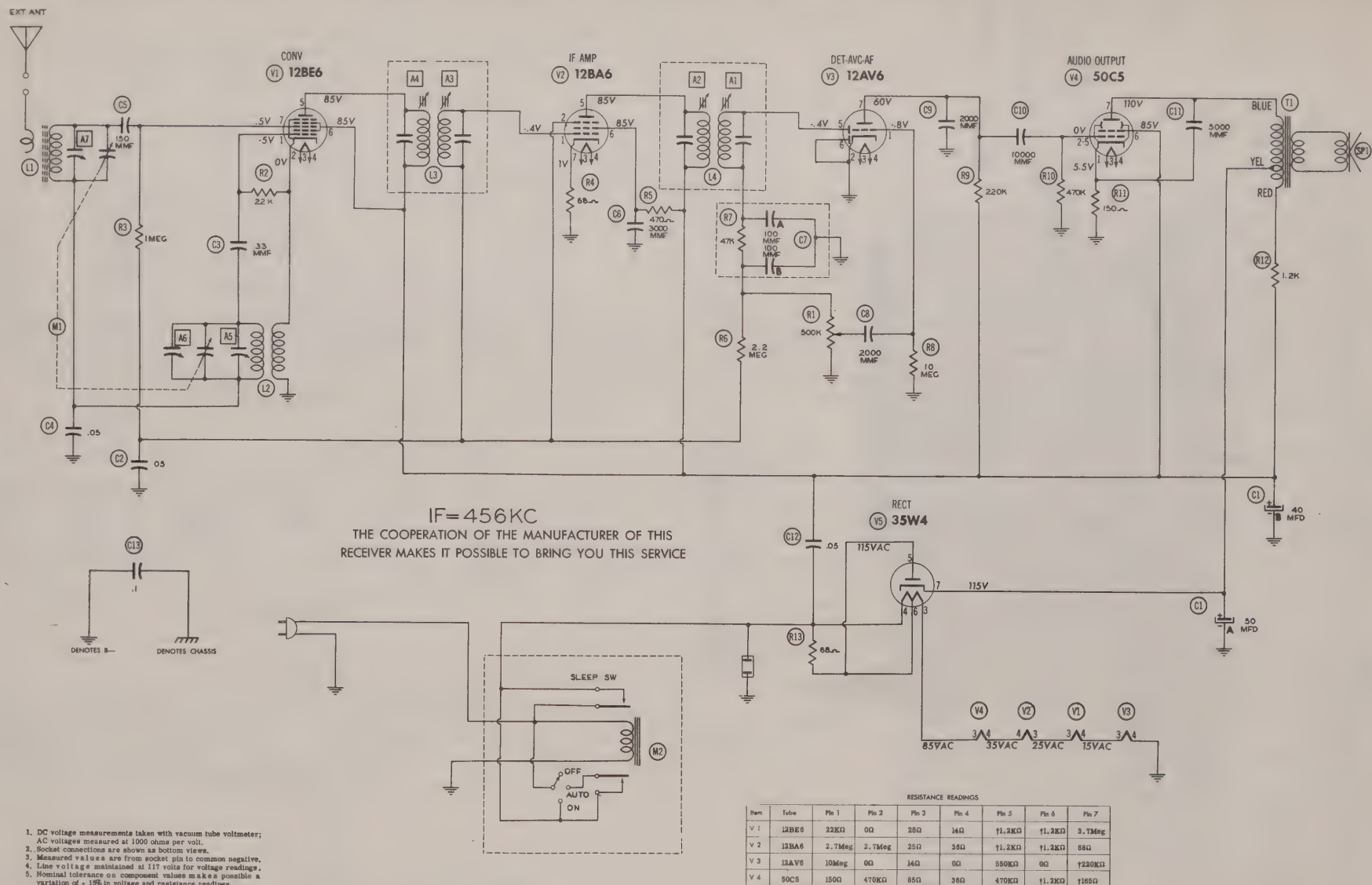
ITEM No.	PART NAME	SPARTON PART No.	NOTES
M1A	Tuning cap	PB40416	Chassis 5B3C 2 section (40-457MMF, 33-195MMF)
B	Tuning cap	PB40416-1	Chassis 5B3
M2	Clock		
	Cabinet	PD90121-1	Charcoal
	Cabinet	PD90121-2	Green
	Cabinet	PD90121-3	Brown
	Cabinet	PD90121-4	Sand
	Knob	PA5657-1	Charcoal-volume
	Knob	PA5657-2	Green-volume
	Knob	PA5657-3	Brown-volume
	Knob	PA5657-4	Sand-volume
	Knob	PA5657	Tuning

CHASSIS—BOTTOM VIEW



PROPERTY OF
L. F. BLANKENSH
3924 MEADE ST.
DENVER, COLORADO

SPARTON
MODEL 320C (Ch. 5B3C)



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	0Ω	25Ω	14Ω	†1.2KΩ	†1.2KΩ	3.7Meg
V 2	12BA6	2.7Meg	2.7Meg	25Ω	38Ω	†1.2KΩ	†1.2KΩ	68Ω
V 3	12AV6	10Meg	0Ω	14Ω	0Ω	550KΩ	0Ω	†230KΩ
V 4	50C5	150Ω	470KΩ	85Ω	36Ω	470KΩ	†1.2KΩ	†165Ω
V 5	35W4	†8Ω	INF	85Ω	130Ω	130Ω	110Ω	100KΩ

† MEASURED FROM PIN 7 OF V5.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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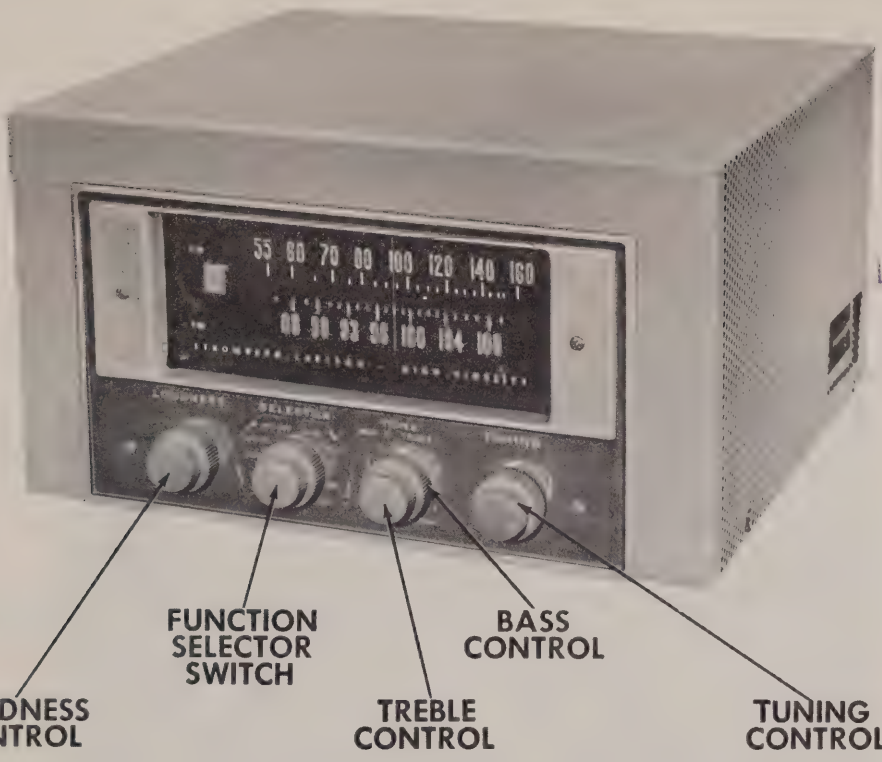
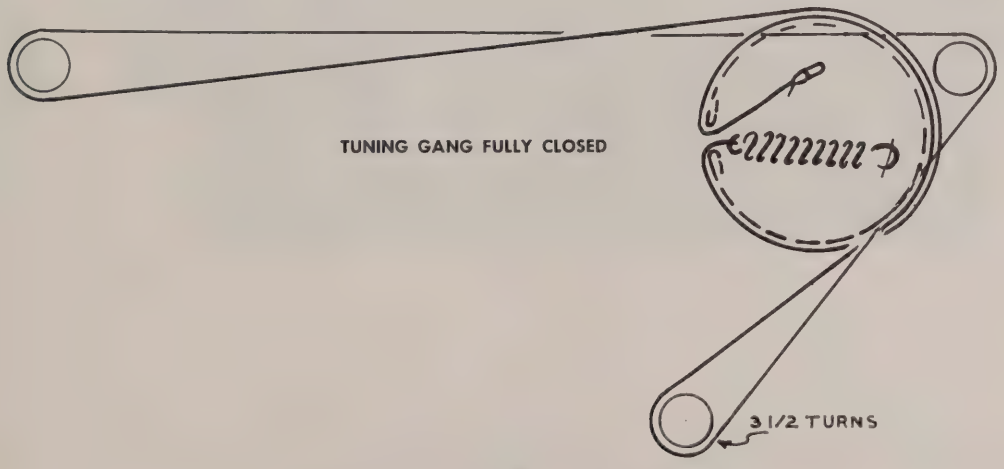
STROMBERG-CARLSON
MODEL SR-405 (Series 103)



PROPERTY OF
L. F. ELECTRONICS
3924 MEADE ST.
DENVER, COLORADO

STROMBERG-CARLSON
MODEL SR-405 (Series 103)

TRADE NAME	Stromberg-Carlson Model SR-405 (Series 103)	
MANUFACTURER	Stromberg-Carlson Co.-Service Dept., 302 N. Goodman St., Rochester, N.Y.	
TYPE SET	AC Operated AM-FM Superheterodyne Receiver with Phono-Equalizer Provisions	
TUBES	Sixteen	
POWER SUPPLY	110-120 Volts AC 50/60 Cycles	RATING .59 Amp. @ 117 Volts AC
TUNING RANGE - BROADCAST	540-1620KC	FREQ. MOD. 88-108MC



DRIVE CORD STRINGING

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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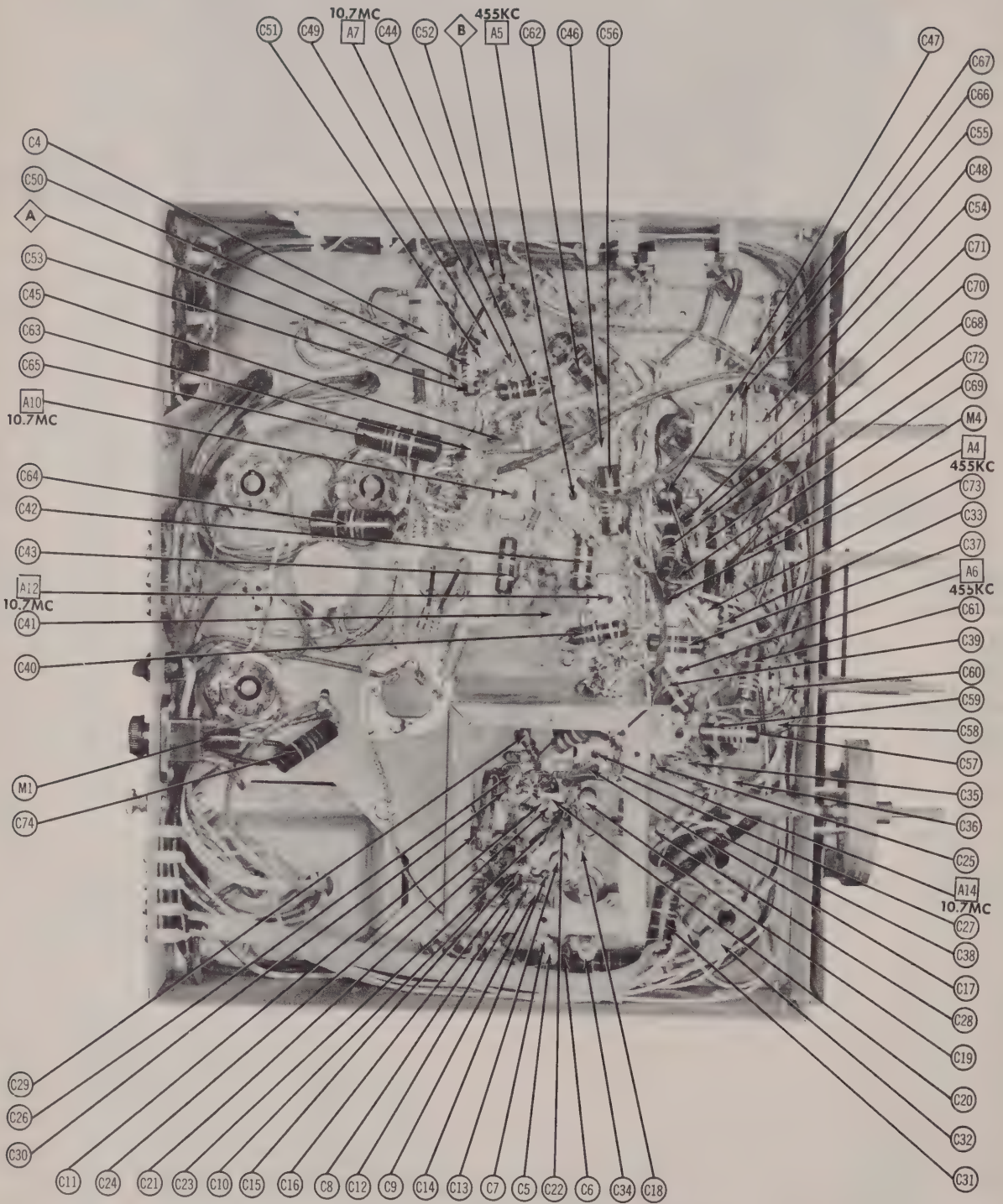
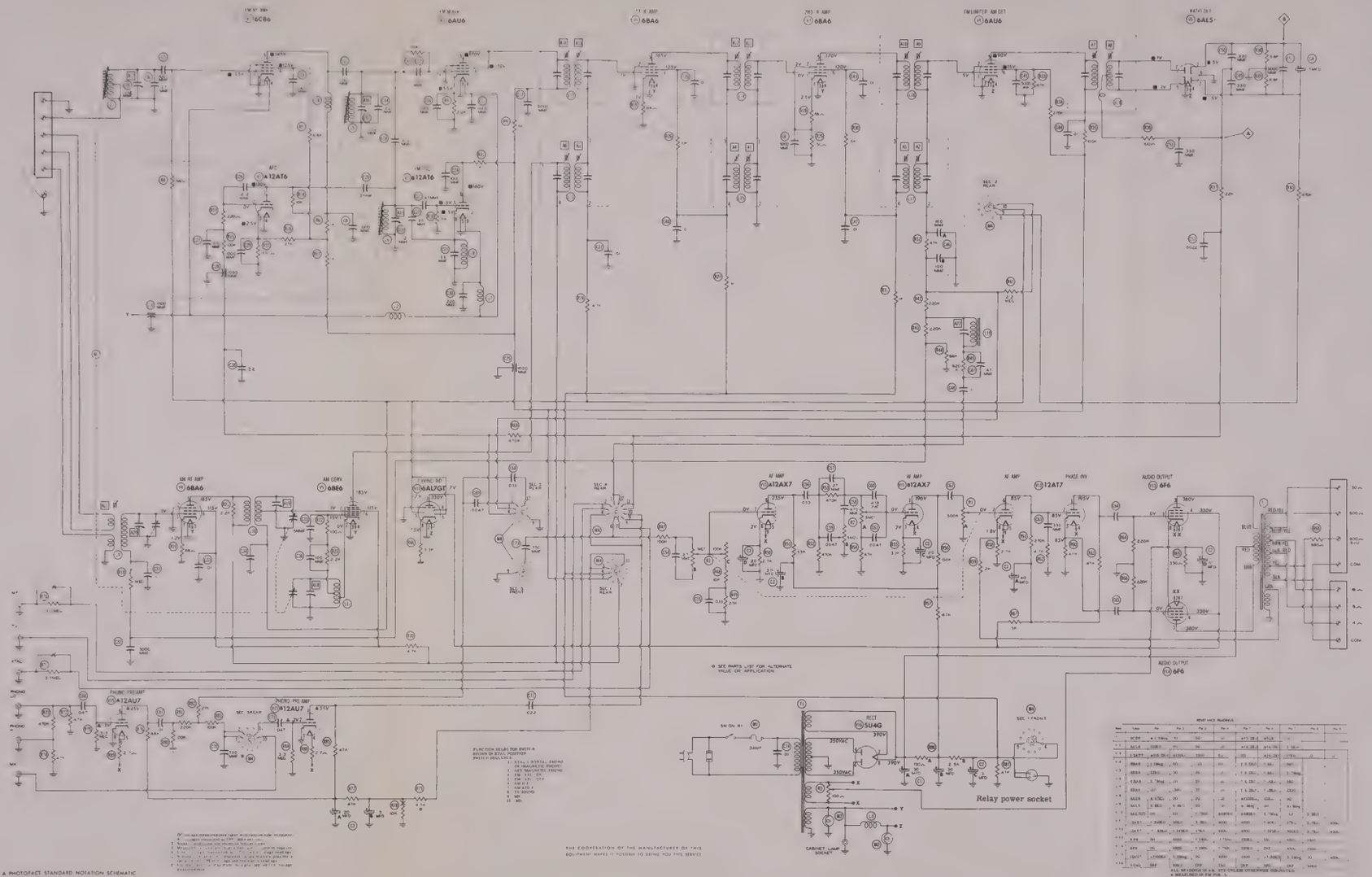
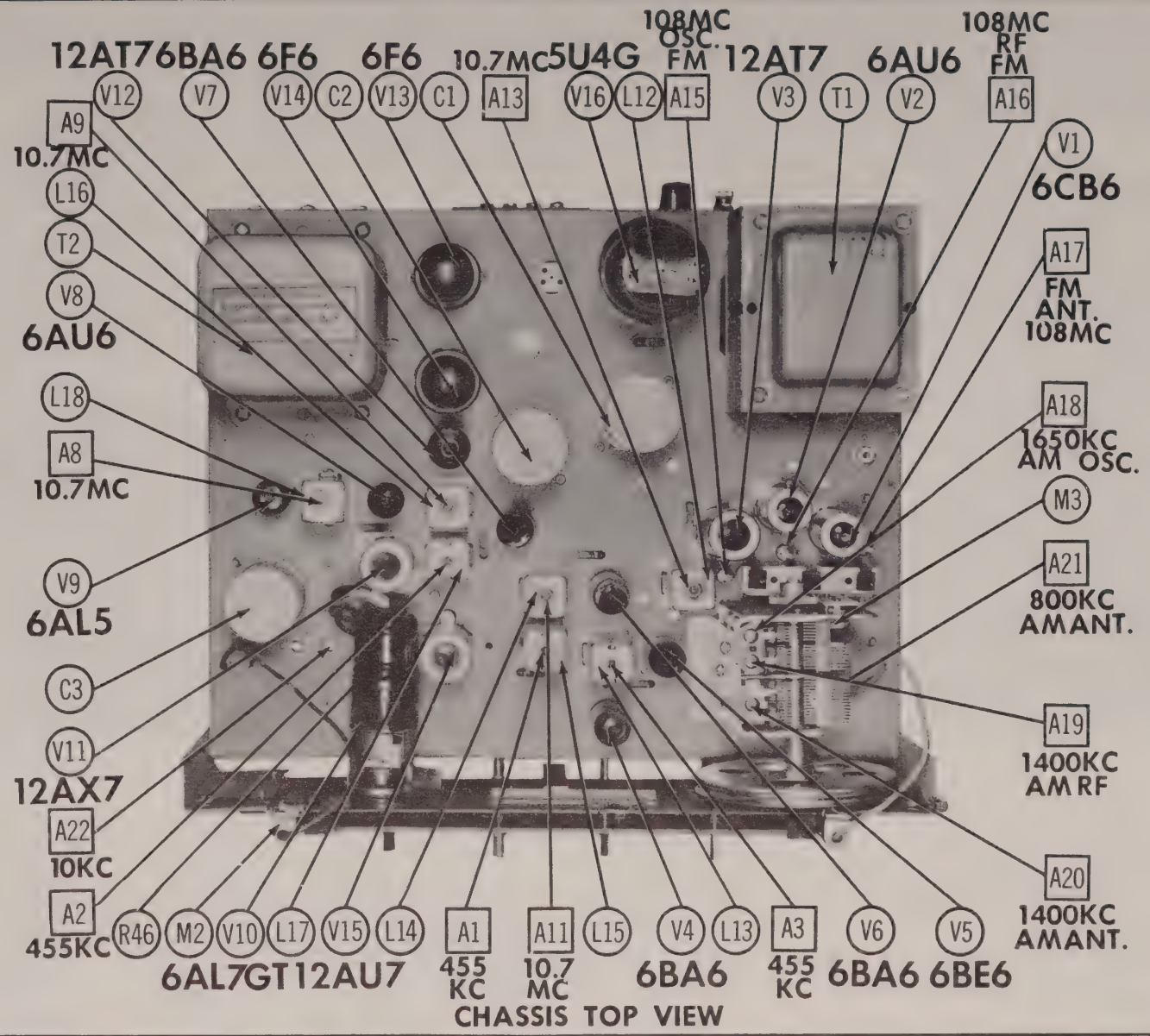


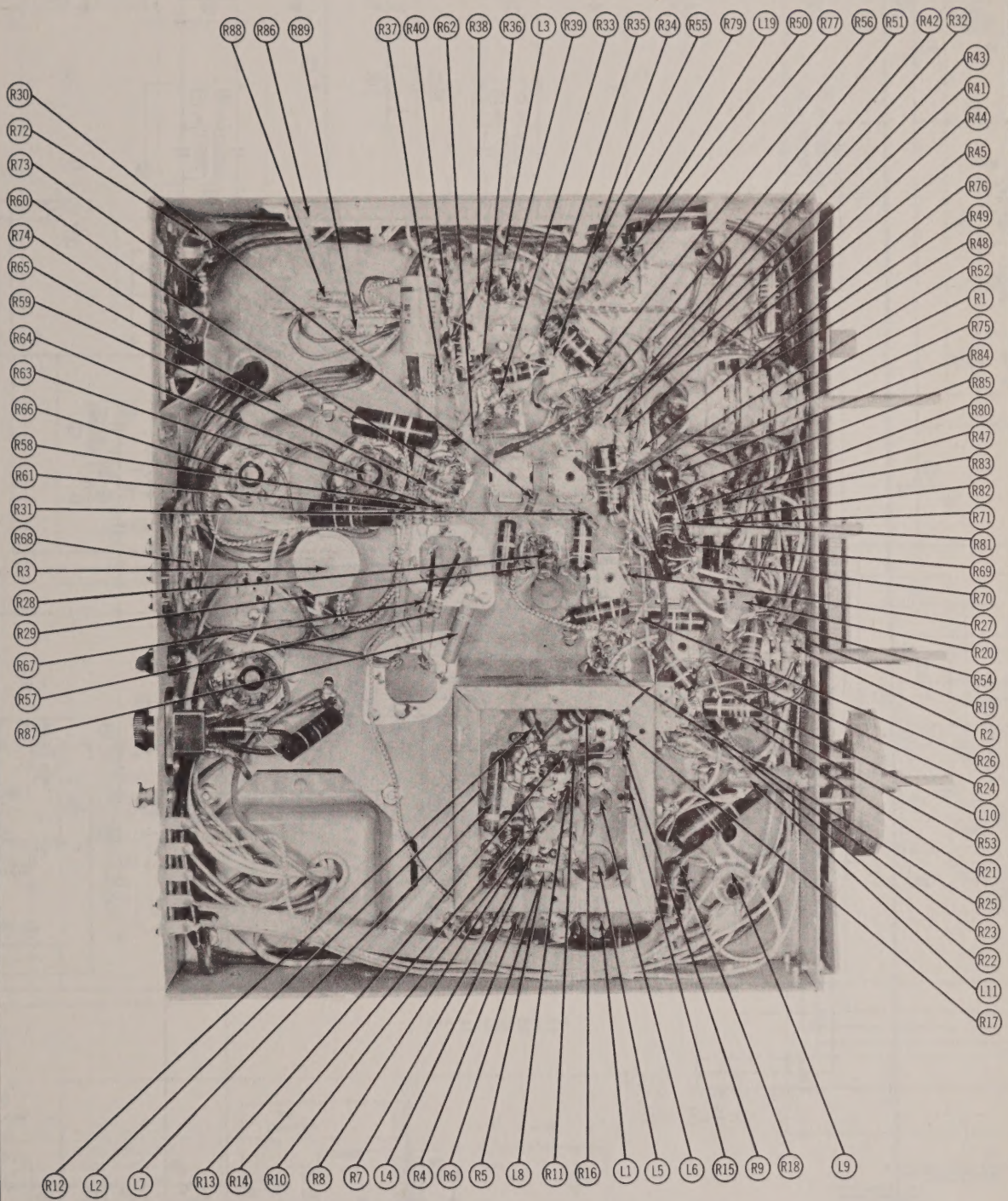
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION


FM RF AMP
6BA6
FM MIXER
6AU6
1ST IF AMP
6BA6
2ND IF AMP
6BA6
FM LIMITER AM DET
6AU6
RATIO DET
6AL5
AM RF AMP
6BA6
AM CONV
6BE6
AF AMP
12AX7
AF AMP
12AX7
AF AMP
PHASE INV
12AT7
AUDIO OUTPUT
6F6
AUDIO OUTPUT
6F6
PHONO PRE AMP
12AU7
PHONO PRE AMP
12AU7
RECT
5U4G
SW ON R1
Relay power socket
CABINET LAMP SOCKET
SEC 1 FRONT
SEC 2 REAR
SEC 3 REAR
SEC 4 REAR
SEC 5 REAR
SEC 6 REAR
SEC 7 REAR
SEC 8 REAR
SEC 9 REAR
SEC 10 REAR
SEC 11 REAR
SEC 12 REAR
SEC 13 REAR
SEC 14 REAR
SEC



CHASSIS TOP VIEW

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
All adjustments should be made in order given.

AM IF ALIGNMENT

With tuning gang fully closed set dial pointer to index mark at top left of dial. Adjust FM tuning slugs so that slugs are flush with the bottom of coil forms.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.01MFD	High side to pin 7 (grid) of 6BE6 (V5). Low side to chassis.	455KC (Unmod.)	AM Hi-Fi	Tuning gang fully closed	DC probe to ungrounded side of C34. Common to chassis.	A1, A2, A3	Adjust for maximum deflection. Connect 1KΩ resistor across primary of IF transformer being adjusted.
2.	"	"	"	"	"	"	A4, A5, A6	Adjust for maximum deflection. Connect 1KΩ resistor across secondary of IF transformer being adjusted.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
3.	.01MFD	High side to junction of L1 and C7. Low side to chassis	10.7MC (Unmod.)	FM AFC "OFF"	Low frequency end of dial	DC probe to point (B). Common to chassis.	A7	Attenuate signal generator to maintain -1 to -1.5 volts at VTVM. Adjust for maximum deflection. Adjust generator for -2 volts at VTVM for step 4.
4.	"	"	"	"	"	DC probe to point (A). Common to chassis.	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
5.	"	"	"	"	"	DC probe to ungrounded side of C34. Common to chassis.	A9, A10 A11, A12 A13, A14	Attenuate signal generator to maintain -1 to 1.5 volts at VTVM. Adjust for maximum deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
3.	.01MFD	High side to junction of L1 and C7. Low side to chassis.	10.7MC (450KC Swp)	FM AFC "Off"	Low frequency end of dial	Vert. Amp. to point (B). Low side to chassis.	A7, A9, A10, A11 A12, A13 A14	Disconnect stabilizer capacitor C4. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
4.	"	"	"	"	"	Vert. Amp. to point (A). Low side to chassis.	A8	Reconnect stabilizer capacitor C4. Adjust so that 10.7MC occurs at center of crossover lines as in Fig. 2. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines. Continue alignment with step 6.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	Two 120Ω Carbon Resistors	Across terminals "FM' and "G" with 120Ω in each lead.	108MC (400% Mod)	FM AFC "Off"	108MC	DC probe to ungrounded side of C34. Common to chassis.	A15	Attenuate signal generator to maintain -1 to -1.5 volts at VTVM. Adjust A15 for maximum deflection.
7.	"	"	88MC	"	88MC	"		Check dial calibration. If necessary reposition C22 in relation to L6 (Osc. Coil) to obtain correct calibration at 88MC. Repeat steps 6 and 7 until correct calibration at 88 and 108MC is obtained.
8.	"	"	108MC	"	108MC	"	A16, A17	Attenuate generator to maintain -1 to 1.5 volts at VTVM. Adjust for maximum deflection. A16 should be adjusted while rocking tuner thru 108MC signal. Check dial calibration at 90MC and 100MC. If necessary, repeat steps 6, 7 and 8. Also, check dial pointer setting according to instructions under AM IF Alignment.

AM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	50Ω Carbon Resistor	With 50Ω in high side connect across loop terminals.	1650KC (400% Mod)	AM Hi-Fi	Tune to 1650KC signal	DC probe to ungrounded side of C34. Common to chassis.	A18	Attenuate generator to maintain -1 to 1.5 volts at VTVM. Adjust for maximum deflection.
10.	"	"	1400KC	"	Tune to 1400KC signal	"	A19, A20	"
11.	"	"	600KC	"	Tune to 600KC signal	"	A21	"
12.	"	"	1000KC	"	Tune to 1000KC signal	"	A19, A20	"
13.	"	"	1000KC (10KC Mod)	"	"	Use output meter. Connect across output terminals to which speaker is connected.	A22	Slowly rock tuner thru 1000KC signal to center of dip in meter reading. Increase signal to provide useable meter indication. Adjust A22 to center of dip in meter reading.

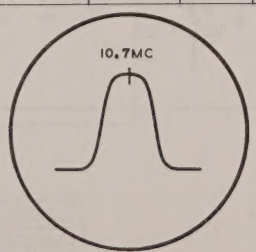


FIG. 1

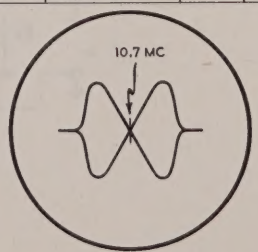


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Stromberg-Carlson PART No.	STANDARD REPLACEMENT		
V1	FM RF Amplifier	6CB6	6CB6	7CM	
V2	FM Mixer	6AU6	6AU6	7BK	
V3	FM Oscillator-AFC	12AT7	12AT7	9A	
V4	AM RF Amplifier	6BA6	6BA6	7BK	
V5	AM Converter	6BE6	6BE6	7CH	
V6	1st IF Amplifier	6BA6	6BA6	7BK	
V7	2nd IF Amplifier	6BA6	6BA6	7BK	
V8	FM Limiter - AM Detector	6AU6	6AU6	7BK	
V9	Ratio Detector	6AL5	6AL5	6BT	
V10	Tuning Indicator	6AL7GT	6AL7GT	8CH	
V11	AF Amplifier	12AX7	12AX7	9A	
V12	AF Amplifier-Phase Inverter	12AT7	12AT7	9A	
V13	Audio Output	6F6	6F6	7S	
V14	Audio Output	6F6	6F6	7S	
V15	Phono Pre. Amp.	12AU7	12AU7	9A	
V16	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Stromberg-Carlson PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲30	500	46320	AFH2-72		B053		FP288	R1069	
B	■30	500								
C2A	▲40	450	35590	AFH4-85		D064		FP447	R1004	
B	■30	350						TCD72		
C	▲15	300								
D	50	50								
C3A	▲20	450	111609	AFH4-66		D089		FP426	TVL-4712	
B	■15	450								
C	▲20	25								
D	20	25								
C4	5	50	111093	PRS150/4		BR550		TC30	TVA-1303	
C5	1-12		110045							
C6	27		110410	SI27NP0	TCZ-27	Z027	NP0L-270			
C7	100		110694							
C8	1000		110818	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C9	1000		110818	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C10	1000		110815							
C11	1000		110818	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C12	100		110694	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C13	1-12		110045							
C14	22		110471	SI22NP0	TCZ-22	TZ14	NP0K-220		5TCC-Q22	
C15	100		110694	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C16	1000		110818	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C17	5000		110586	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C18	.22		110439		TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C19	1-12		110045							
C20	5		110584	SI5NP0	TCZ-4.7	TZ07	NP0K-500	ZT-555		
C21	47		110458	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C22	33		110407	SI33NP0	TCZ-33	TZ18	NP0L-330	ZT-5433	5TCC-Q33	
C23	33		110816							
C24	1000		110818	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C25	1000		110815							
C26	2.2		110439		TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C27	100		110694	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C28	1000		110815							
C29	1000		110818	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C30	220		110453	SI220	D6-221	TP37	GP2K-221	UC-5322	5GA-T22	
C31	.1	200	110661	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C32	5000		110586	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C33	.01	400	110540	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C34	.1	400	110661	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C35	5		110413	SI5N750	TCN-5	ND11	N750A-500		5TCUB-V5	

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Stromberg-Carlson PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C36	100		110694	SI101	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C37	.01	400	110540	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C38	.22	400	110548	P488-22		PJ4P22		PT4022	4TM-P22	
C39	.01	400	110540	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C40	.01	400	110540	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C41	5000		110586	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C42	.01	400	110540	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C43	.01	400	110540	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C44	.01	400	110540	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C45	5000		110586	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C46A	100		♦110478	♦PA-97	♦PC-50	♦111TM1	♦1403-01	UC-531	♦100C1	
B	100							UC-531		
C47	47		110458	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C48	.1	400	110661	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C49	330		110463	SI330	D6-331	TP43	GP2K-331	UC-5333	5GA-T33	
C50	330		110463	SI330	D6-331	TP43	GP2K-331	UC-5333	5GA-T33	
C51	330		110463	SI330	D6-331	TP43	GP2K-331	UC-5333	5GA-T33	
C52	5000		110586	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C53	.0022	400	110817	P488-0022	D6-222	CUB4D22	GP2-333-222	PT4222	4TM-D22	
C54	27		110410	SI27NP0	TCZ-27	Z027	NP0L-270			
C55	.033	400	110543	P488-033		CUB4S33		PT4133	4TM-S33	
C56	.033	400	110543	P488-033		CUB4S33		PT4133	4TM-S33	
C57	27		110410	SI27NP0	TCZ-27	Z027	NP0L-270			
C58	470		110455	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C59	.0047	400	110538	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4247	4TM-D47	
C60	470		110455	SI470	D6-471	TP460	GP2K-471	UC-5347	5GA-T47	
C61	.0047	400	110538	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4247	4TM-D47	
C62	.1	200	110661	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C63	330		110463	SI330	D6-331	TP43	GP2K-331	UC-5333	5GA-T33	
C64	.1	400	110546	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C65	.1	400	110546	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C66	.047	400	110544	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C67	.01	200	110540	P288-01	D6-103	PJ2S1	GP2-333-103	PT411	2TM-S1	
C68	.033	400	110543	P488-033		CUB4S33		PT4133	4TM-S33	
C69	.0047	400	110538	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4247	4TM-D47	
C70	750		110676							Note 1
C71	.047	400	110544	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C72	.022	400	110542	P488-022		CUB4S22		PT4122	4TM-S22	
C73	750		110676							
C74	.01	600	110555	689ZX-01		PJ6S1		PT611	6TM-S1	

Note 1. Some Models use a 1000MMF in this application.

♦ Items C46A, C46B and R32 are combined in one unit.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Stromberg-Carlson PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	145627	Q11-133				Loudness
B	1 Meg	½	Not Req.	M13-137				Attach to R1A
C	100KΩ	½	Not Req.	M13-128				Attach to R1B
D	Switch		Not Req.	76-1				Attach to R1C
R2A	5 Meg	½	145628	♦ QJ-522R				Bass
B	5 Meg	½	Not Req.					Treble
R3A	100	2	♦ 46486	W-100	A43-100	VK-121	R100L	Hum Balance
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R3A

♦ CONCENTRIKIT EQUIVALENT KIT K-2, BASE ELEMENTS & SHAFTS B13-141 & P1-126 (Panel) B13-141 & R2-209 (Rear).

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Stromberg-Carlson PART No.	IRC PART No.	
R4	1 Meg	½	149119	BTS-1 Meg	
R5	6800Ω	1	149400	BTA-6800	
R6	1000Ω	½	149101	BTS-1000	
R7	100KΩ	½	149113	BTS-100K	
R8	2200Ω	½	28162	BTS-2200	
R9	1000Ω	½	149101	BTS-1000	
R10	10KΩ	½	149107	BTS-10K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Stromberg-Carlson PART No.	IRC PART No.	
R48	10KΩ	½	149107	BTS-10K	
R49	27KΩ	½	28174	BTS-27K	
R50	2700Ω	½	28163	BTS-2700	
R51	33KΩ	½	28175	BTS-33K	
R52	470KΩ	½	28187	BTS-470K	
R53	470KΩ	½	28187	BTS-470K	
R54	47KΩ	½	28177	BTS-47K	

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PARTS LIST AND DESCRIPTIONS (Continued)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Stromberg-Carlson PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R11	1000Ω	1/2	149101	BTS-1000	
R12	330Ω	1/2	28152	BTS-330	
R13	220Ω	1/2	28150	BTS-220	
R14	10KΩ	1	149402	BTA-10K	
R15	100KΩ	1/2	149385	BTS-100K	
R16	27KΩ	2	149058	BTB-27K	
R17	1000Ω	1/2	149101	BTS-1000	
R18	1 Meg	1/2	149119	BTS-1 Meg	
R19	68Ω	1/2	28144	BTS-68	
R20	4700Ω	2	149051	BTB-4700	
R21	2200Ω	1/2	28162	BTS-2200	
R22	100Ω	1/2	149095	BTS-100	
R23	22KΩ	1/2	149109	BTS-22K	
R24	4700Ω	1/2	28166	BTS-4700	
R25	68Ω	1/2	28144	BTS-68	
R26	10KΩ	1/2	28170	BTS-10K	
R27	1000Ω	1/2	149101	BTS-1000	
R28	68Ω	1/2	28144	BTS-68	
R29	150Ω	1/2	28148	BTS-150	
R30	15KΩ	1/2	149108	BTS-15K	
R31	1000Ω	1/2	149101	BTS-1000	
R32	47KΩ	1/2	♦ 110478	BTS-47K	
R33	47KΩ	1/2	28177	BTS-47K	
R34	270KΩ	1/2	28184	BTS-270K	
R35	100KΩ	1/2	149113	BTS-100K	
R37	22KΩ	1/2	149234	BTS-22K	
R38	6800Ω	1/2	28168	BTS-6800	
R39	6800Ω	1/2	28168	BTS-6800	
R40	470KΩ	1/2	28187	BTS-470K	
R41	2.2Meg	1/2	149121	BTS-2.2Meg	
R42	220KΩ	1/2	28183	BTS-220K	
R43	220KΩ	1/2	28183	BTS-220K	
R44	68KΩ	1/2	28179	BTS-68K	
R45	820KΩ	1/2	28190	BTS-820K	
R46	3300Ω	1/2	28164	BTS-3300	
R47	100KΩ	1/2	149385	BTS-100K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Stromberg-Carlson PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R55	3300Ω	1/2	28164	BTS-3300	
R56	150KΩ	1/2	149386	BTS-150K	
R57	47KΩ	1/2	28177	BTS-47K	
R58	2700Ω	1/2	28163	BTS-2700	
R59	12KΩ	1/2	28171	BTS-12K	
R60	47KΩ	1/2	28177	BTS-47K	
R61	270KΩ	1/2	28184	BTS-270K	
R62	4700Ω	1/2	28166	BTS-4700	
R63	47KΩ	1/2	28177	BTS-47K	
R64	220KΩ	1/2	28183	BTS-220K	
R65	350Ω	5	46369	1 3/4A-350	
R66	220KΩ	1/2	28183	BTS-220K	
R67	15KΩ	1/2	149108	BTS-15K	
R68	680Ω	1/2	28156	BTS-680	
R69	470KΩ	1/2	28187	BTS-470K	
R70	3.3Meg	1/2	149122	BTS-3.3Meg	Note 1
R71	3.3Meg	1/2	149122	BTS-3.3Meg	Note 1
R72	47KΩ	1/2	28177	BTS-47K	
R73	470KΩ	1/2	28187	BTS-470K	
R74	47KΩ	1/2	28177	BTS-47K	
R75	3.3Meg	1/2	149122	BTS-3.3Meg	
R76	68KΩ	1/2	28179	BTS-68K	
R77	47KΩ	1/2	28177	BTS-47K	
R78	10KΩ	1	149402	BTA-10K	Note 2
R79	4700Ω	1	149183	BTA-4700	Note 3
R80	100KΩ	1/2	149385	BTS-100K	
R81	220KΩ	1/2	28183	BTS-220K	
R82	27KΩ	1/2	28174	BTS-27K	
R83	100KΩ	1/2	149385	BTS-100K	
R84	3.3Meg	1/2	149122	BTS-3.3Meg	
R85	47KΩ	1/2	28177	BTS-47K	
R86A	750Ω	6	149612		
B	2500Ω	11.9			
R87	47KΩ	2	149086	BTB-47K	
R88	2.7Ω	1	149424		
R89	2.7Ω	1	149424		

♦ Items R32, C46A, C46B are combined in one unit.
Note 1. To reduce sensitivity of " XTL" and "MR" Inputs, cut jumpers on R70 and R71.
Note 2. Not used in all models.
Note 3. Some models may use a 4700Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA Stromberg-Carlson PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @ .59A	684VCT .142 ADC	5VAC @ 3A	6.3VAC @ 3.3A SEC. 4 6.3VAC @ 2.5A	161776					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA Stromberg-Carlson PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T2	10KΩCT	600Ω tap @ 150Ω 16Ω, 8Ω, 4Ω	161337						

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA Stromberg-Carlson PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Coil	0Ω(tapped)		114097				
L2	Fil. Choke	.14Ω		114707				.47 Microhenry; IRC Part # CL-1
L3	Fil. Choke	.3Ω		114618				
L4	FM RF Choke	1.1Ω		114693			4606	2.2Microhenries; IRC Part # CL-1
L5	FM RF Coil	0Ω		114098				
L6	FM Osc. Coil	0Ω		114098				
L7	Fil. Choke	.14Ω		114707				.47 Microhenries; IRC Part # CL-1
L8	Cathode Choke	.1Ω		114620				
L9	AM Ant. Coil	.4Ω	5.5Ω	114122				Non-Directional antenna primary winding= 35Ω
L10	AM RF Coil	1.2Ω	10Ω	114095	14-1076			See. tapped @ 5.5Ω
L11	AM Osc. Coil	4Ω		114123	14-1060		71-Osc.	Tapped @ .3Ω and @ 3.1Ω
L12	1st FM IF	1.2Ω	1.2Ω	114363	16-3487	FM-254	1463	
L13	1st AM IF	9Ω	9Ω	114414	16-6758	BC-353	12-C2	
L14	2nd FM IF	1.2Ω	1.2Ω	114363	16-3487	FM-254	1463	
L15	2nd AM IF	9Ω	9Ω	114414	16-6758	BC-353	12-C2	
L16	3rd FM IF	1.2Ω	1.2Ω	114363	16-3487	FM-254	1463	
L17	3rd AM IF	9Ω	9Ω	114414	16-6758	BC-353	12-C2	
L18	Ratio Det.	2.9Ω	.4ΩCT	114404	17-3488 †	FM-255	1465	Tertiary winding=.5Ω

† Cut out chassis hole and drill mounting holes.

10 KC FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA Stromberg-Carlson PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L19		914Ω		161044					

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA Stromberg-Carlson PART No. FUSE	Stromberg-Carlson PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	3A 250V	25156		312003. (3AG-3A)	342001	AGC3	HKP

MISCELLANEOUS

ITEM No.	PART NAME	Stromberg-Carlson PART No.	NOTES
M2	Dial light	30933	(2) # 47 bayonet
M3	Tuning cap	110121	3 section (38-472MMF, 18-240MMF, 15-105MMF)
M4	Switch	158652	Function
A22	Trimmer cap	110056	30-270MMF (10KC Filter)